

Appendix A

RF Test Data for BT V5.0(BDR/EDR) (Conducted Measurement)

Product Name: Wireless Speaker
Trade Mark: Bud light Tower Speaker
Test Model: TWG3772

Environmental Conditions

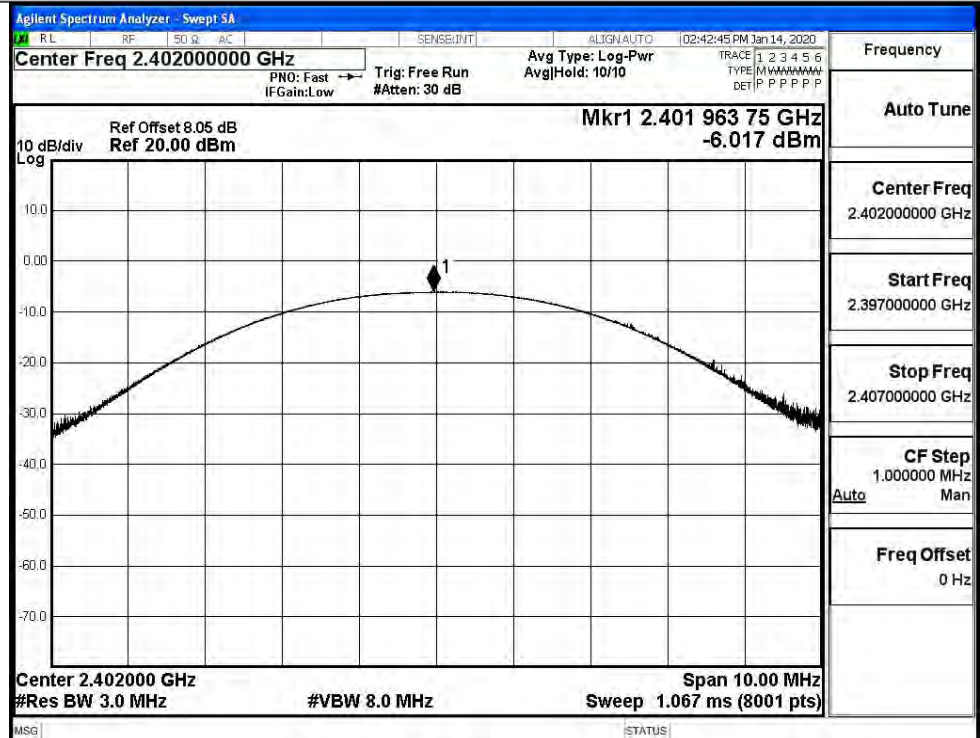
Temperature:	22.9 ° C
Relative Humidity:	54.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond.Lu
Supervised by:	Tom.Liu

A.1 Maximum Conducted Peak Output Power

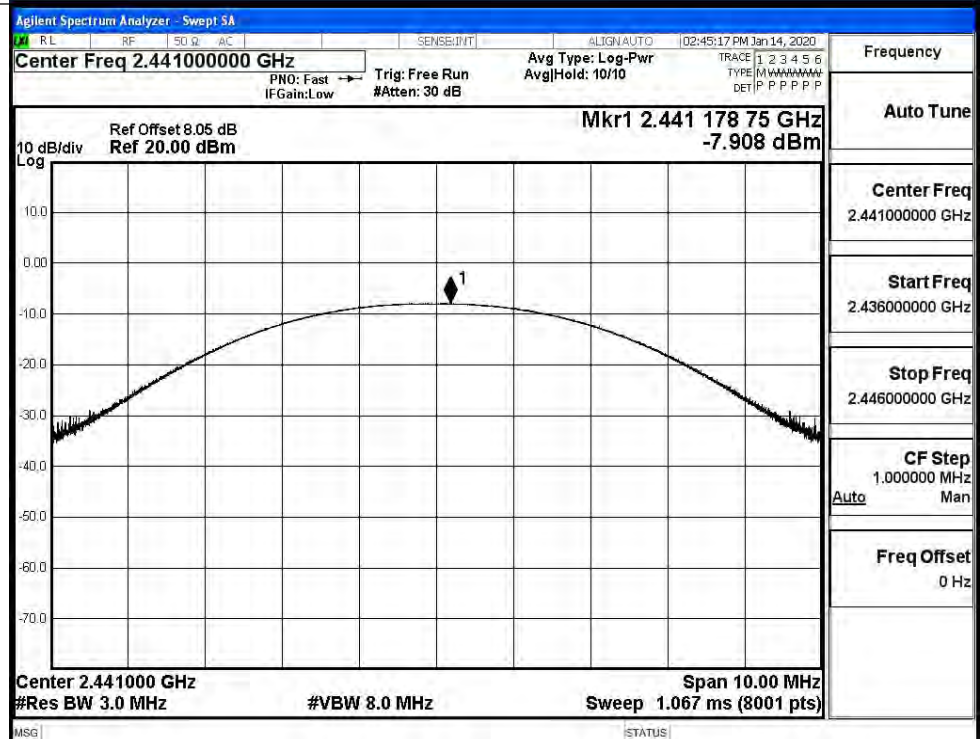
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-6.017	30	PASS
	MCH	-7.908	30	PASS
	HCH	-5.486	30	PASS
$\pi/4$ DQPSK	LCH	-6.829	21	PASS
	MCH	-8.603	21	PASS
	HCH	-6.101	21	PASS
8DPSK	LCH	-6.612	21	PASS
	MCH	-8.347	21	PASS
	HCH	-5.963	21	PASS

Test Graphs

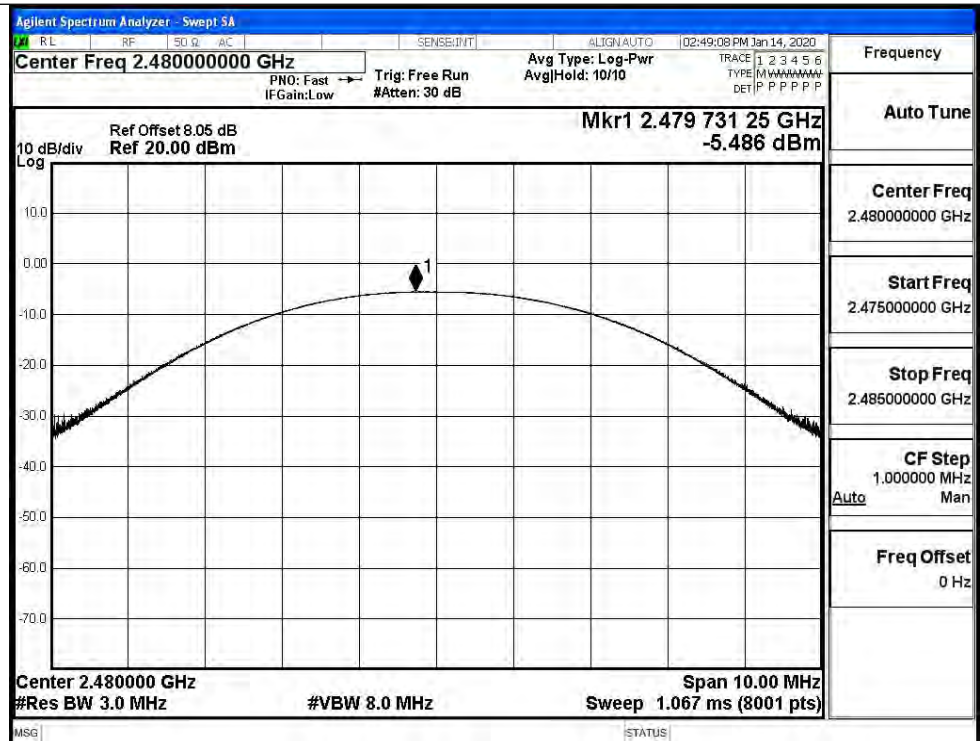
GFSK/LCH



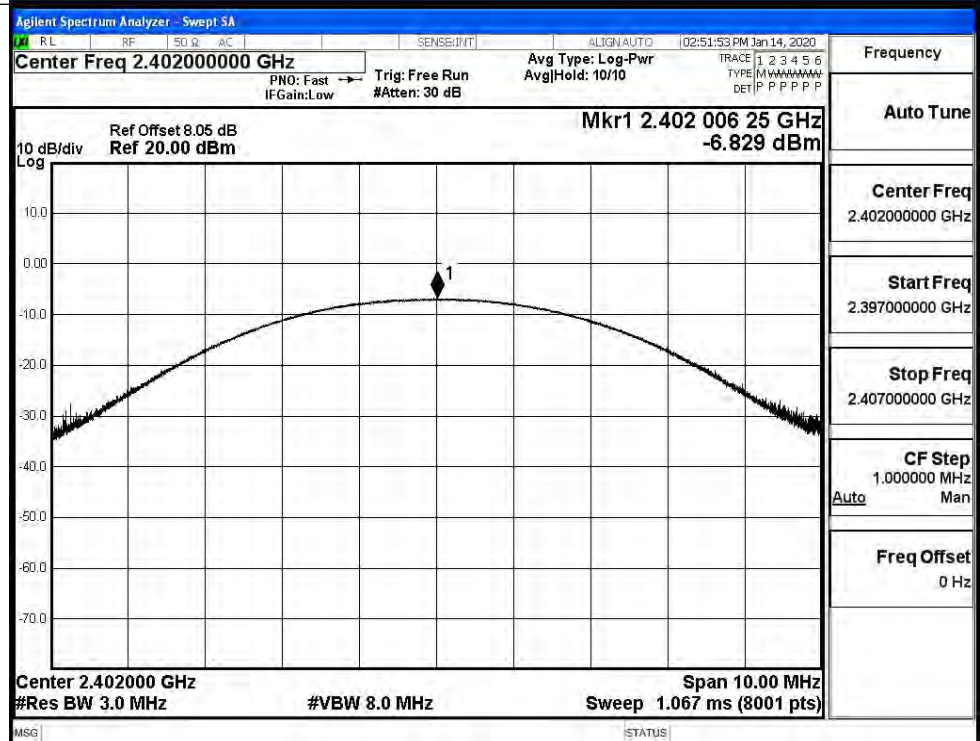
GFSK/MCH

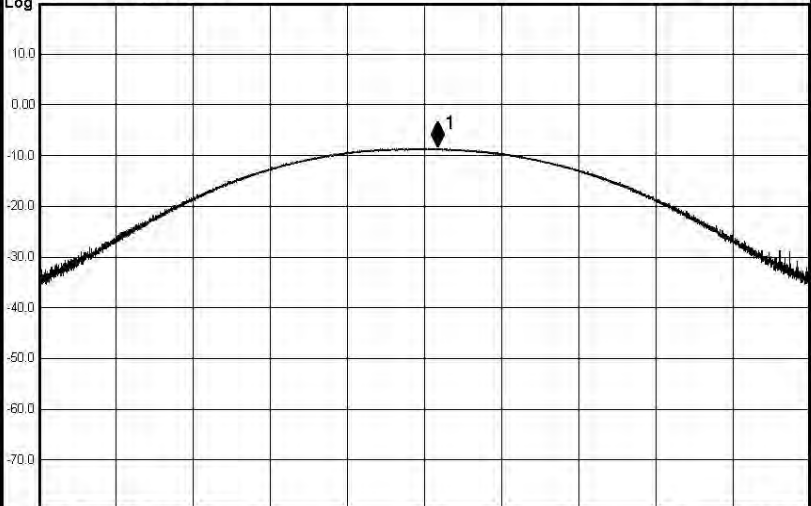
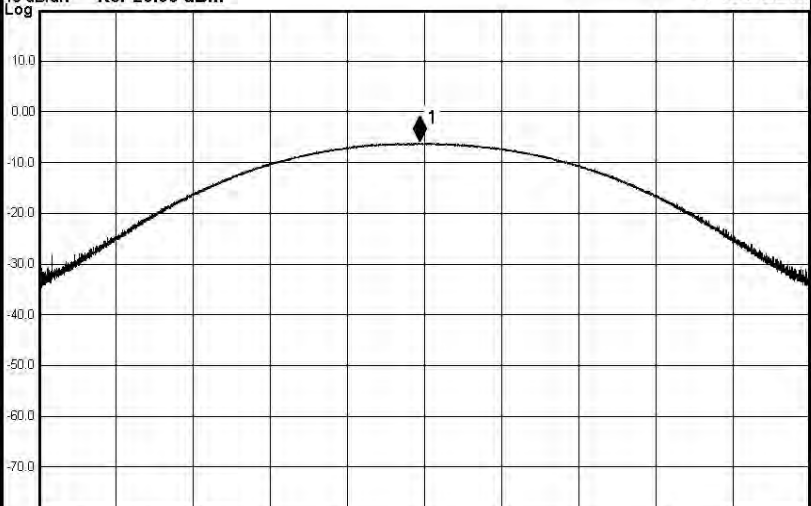


GFSK/HCH

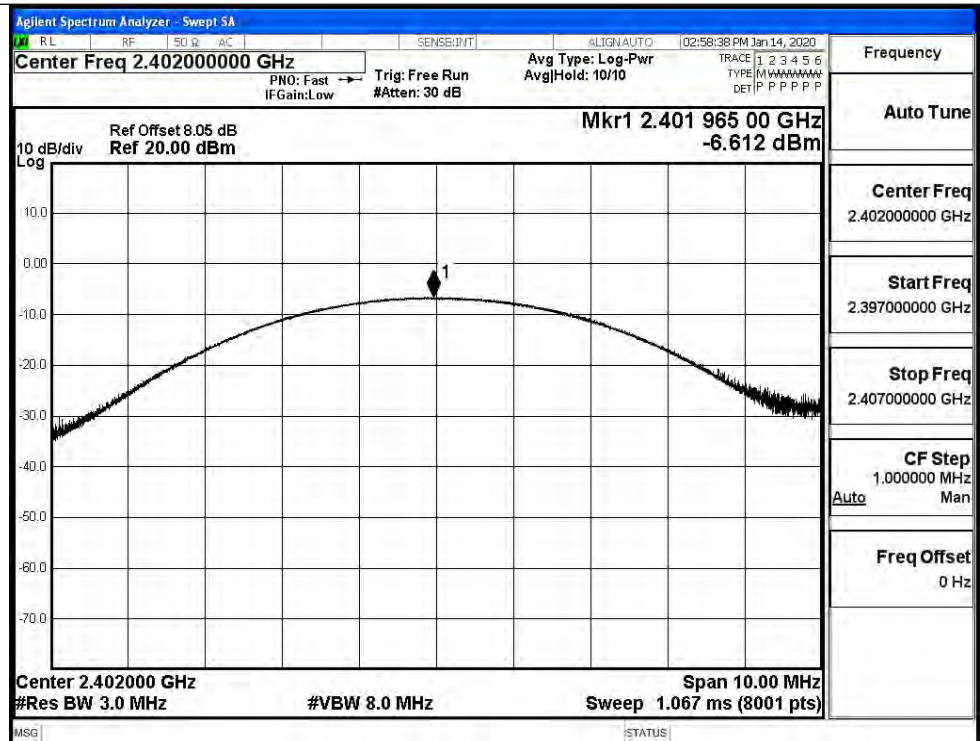


$\pi/4$ DQPSK/LCH

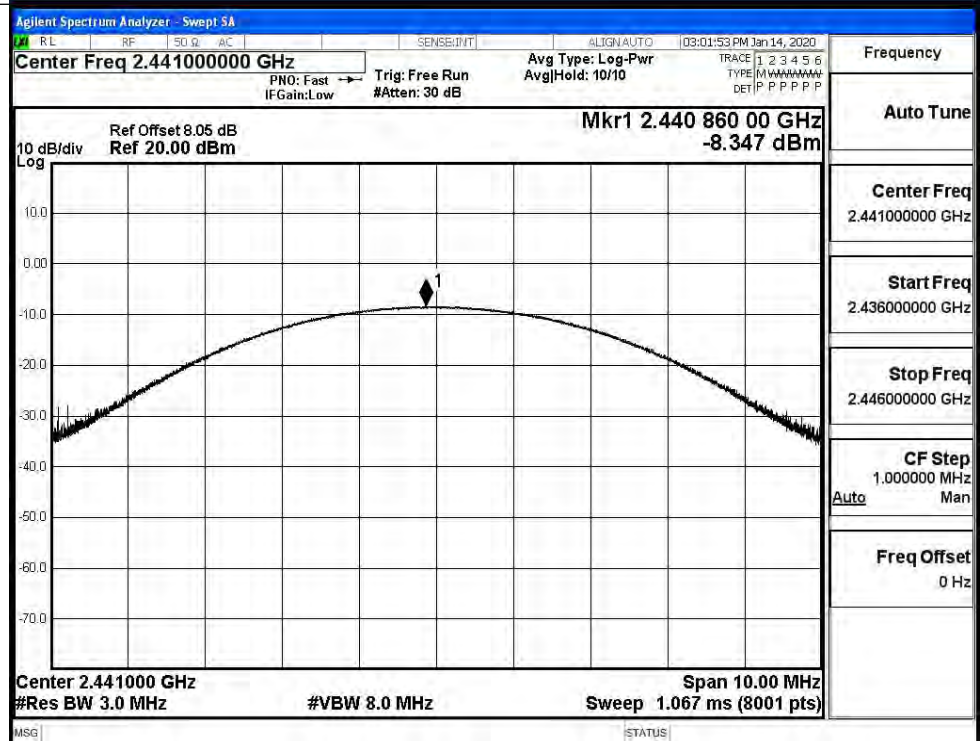


$\pi/4$DQPSK/MCH	Agilent Spectrum Analyzer - Swept SA Center Freq 2.441000000 GHz Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.441 176 25 GHz -8.603 dBm  Center 2.441000 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Sweep 1.067 ms (8001 pts) Span 10.00 MHz Frequency Auto Tune Center Freq 2.441000000 GHz Start Freq 2.436000000 GHz Stop Freq 2.446000000 GHz CF Step 1.000000 MHz Auto Man Freq Offset 0 Hz
$\pi/4$DQPSK/HCH	Agilent Spectrum Analyzer - Swept SA Center Freq 2.480000000 GHz Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.479 937 50 GHz -6.101 dBm  Center 2.480000 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Sweep 1.067 ms (8001 pts) Span 10.00 MHz Frequency Auto Tune Center Freq 2.480000000 GHz Start Freq 2.475000000 GHz Stop Freq 2.485000000 GHz CF Step 1.000000 MHz Auto Man Freq Offset 0 Hz

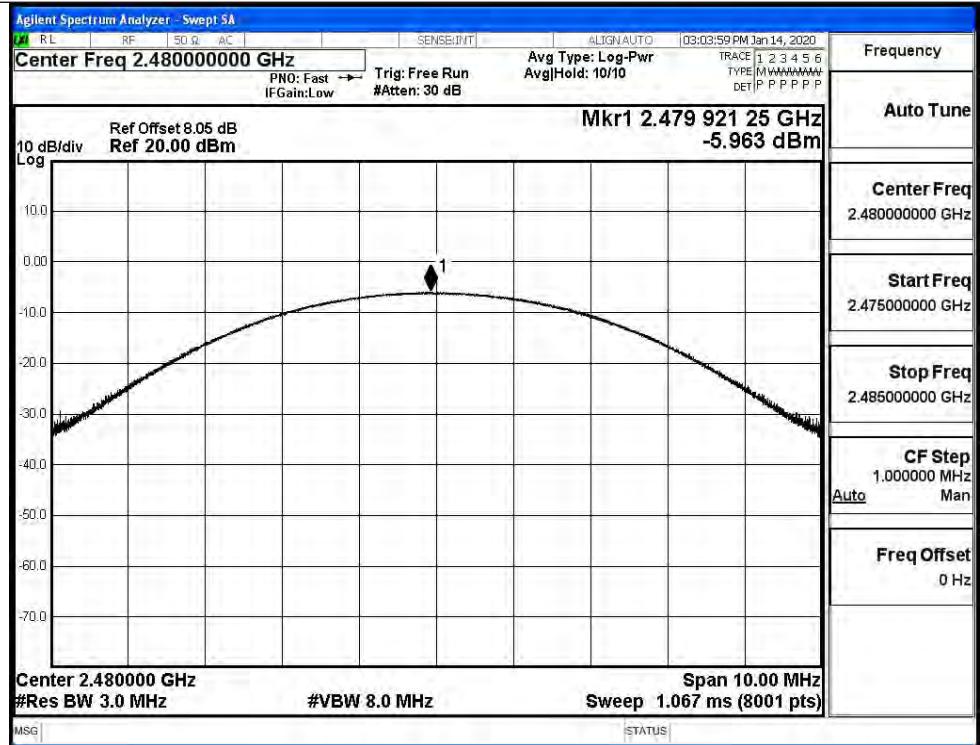
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH



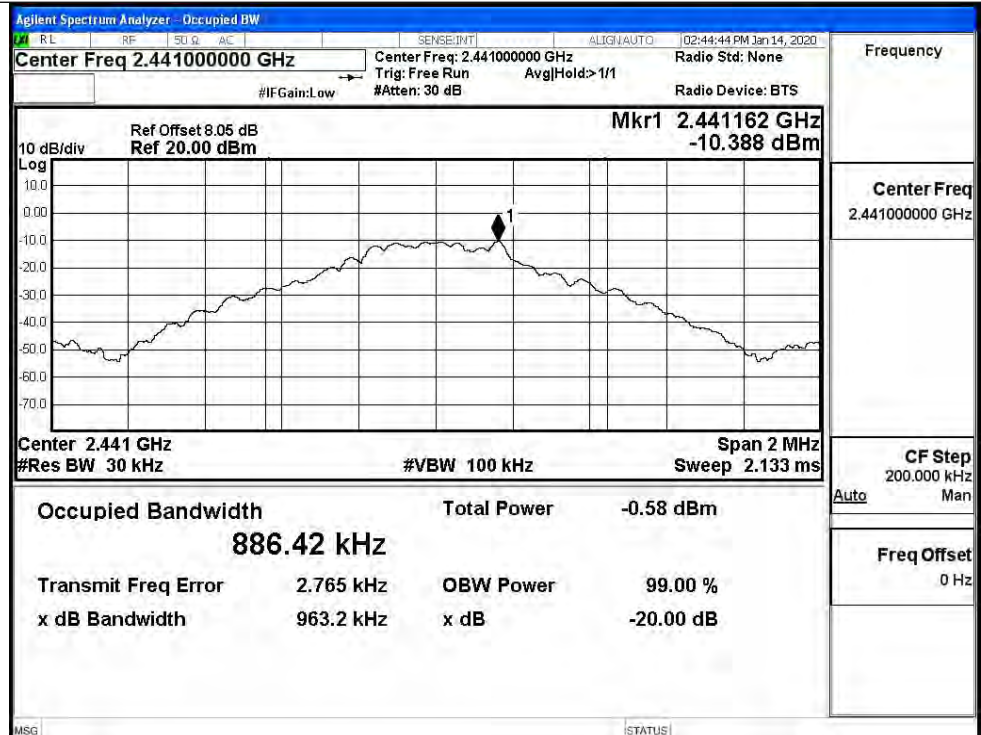
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9660	Not Specified	PASS
	MCH	0.9632	Not Specified	PASS
	HCH	1.032	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.293	Not Specified	PASS
	MCH	1.315	Not Specified	PASS
	HCH	1.310	Not Specified	PASS
8DPSK	LCH	1.293	Not Specified	PASS
	MCH	1.300	Not Specified	PASS
	HCH	1.296	Not Specified	PASS

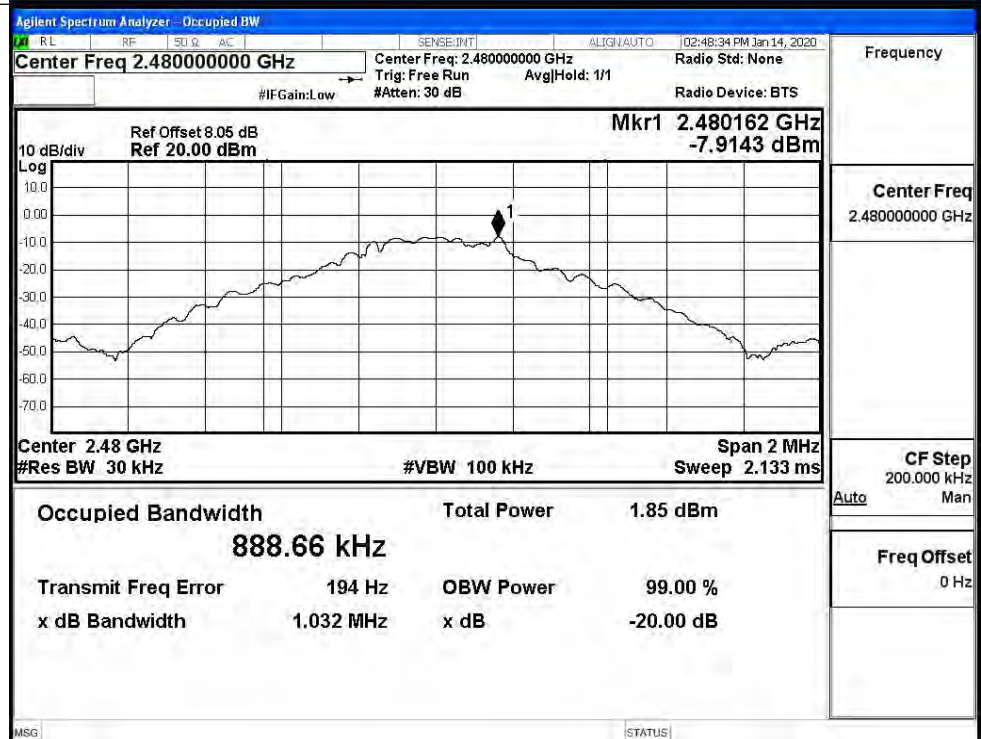
Test Graphs



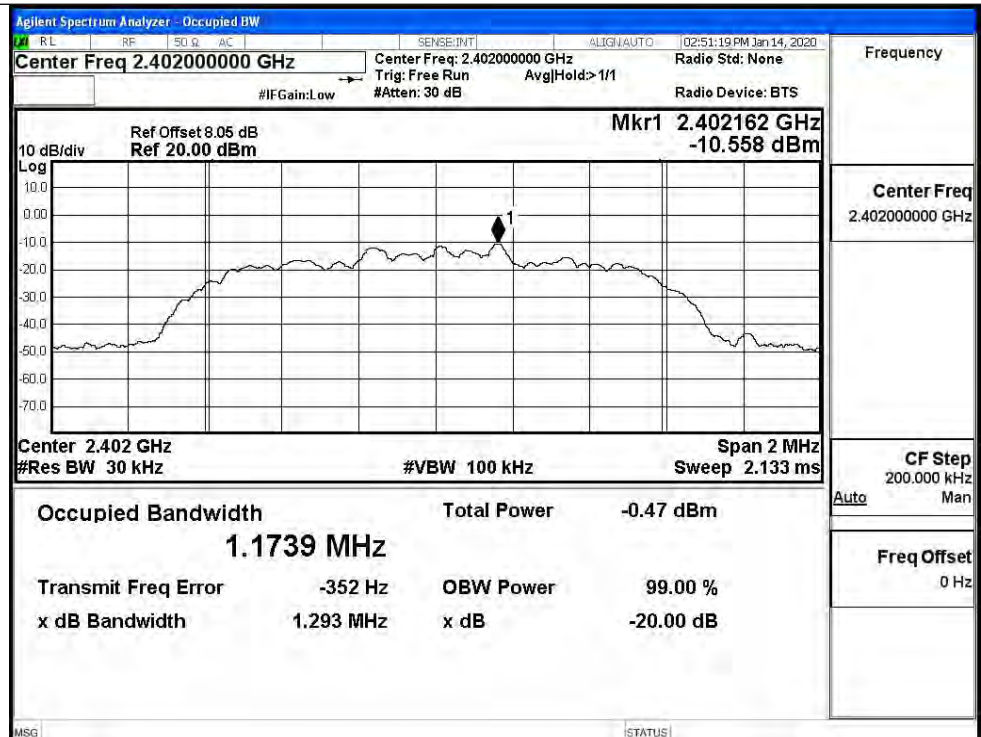
GFSK/MCH



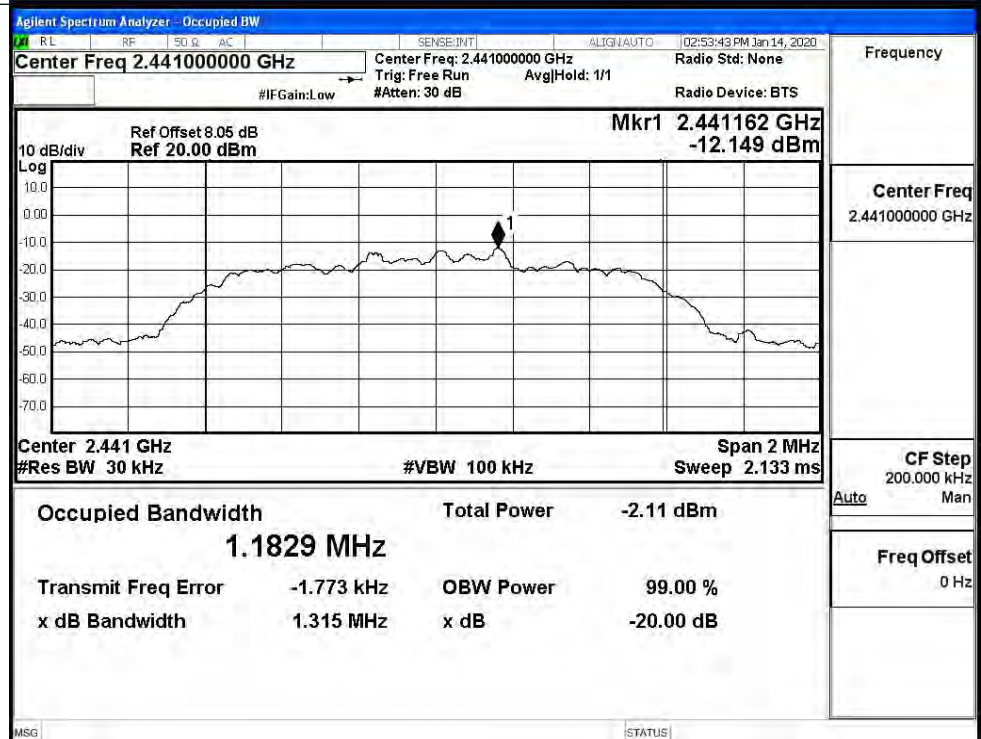
GFSK/HCH

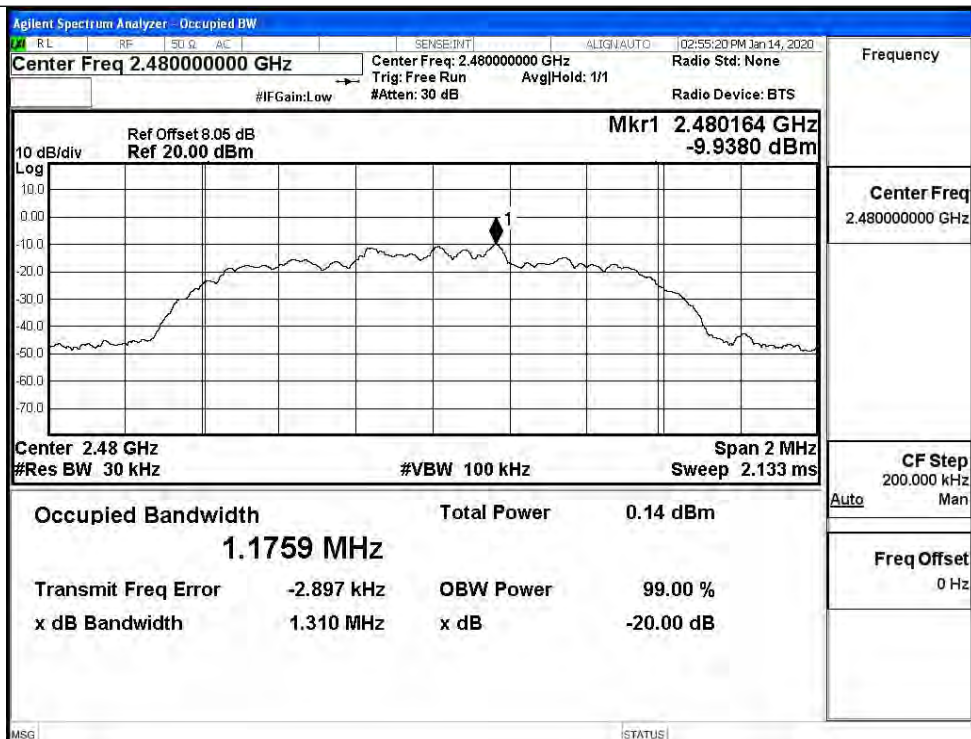


$\pi/4$ DQPSK/LCH

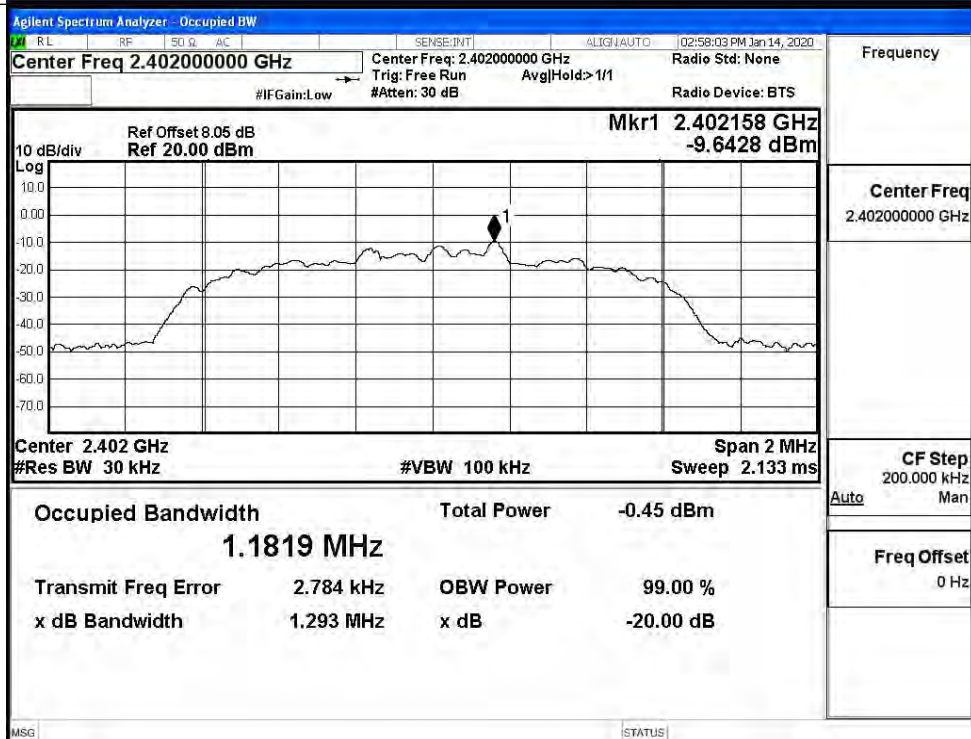


$\pi/4$ DQPSK/MCH

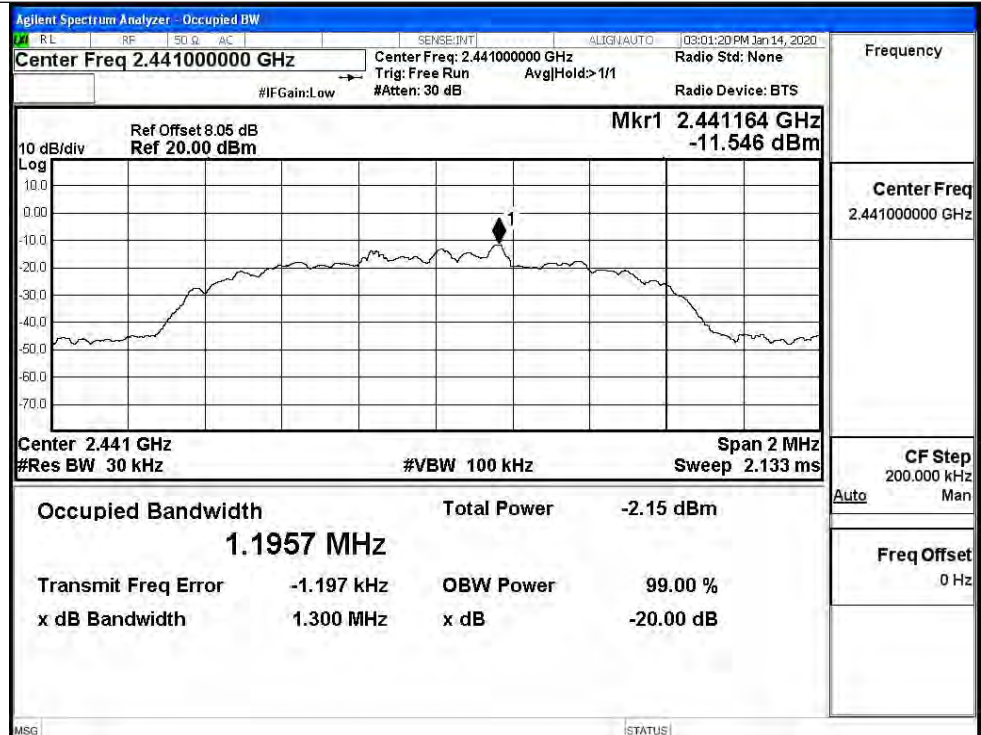


$\pi/4$ DQPSK/HCH

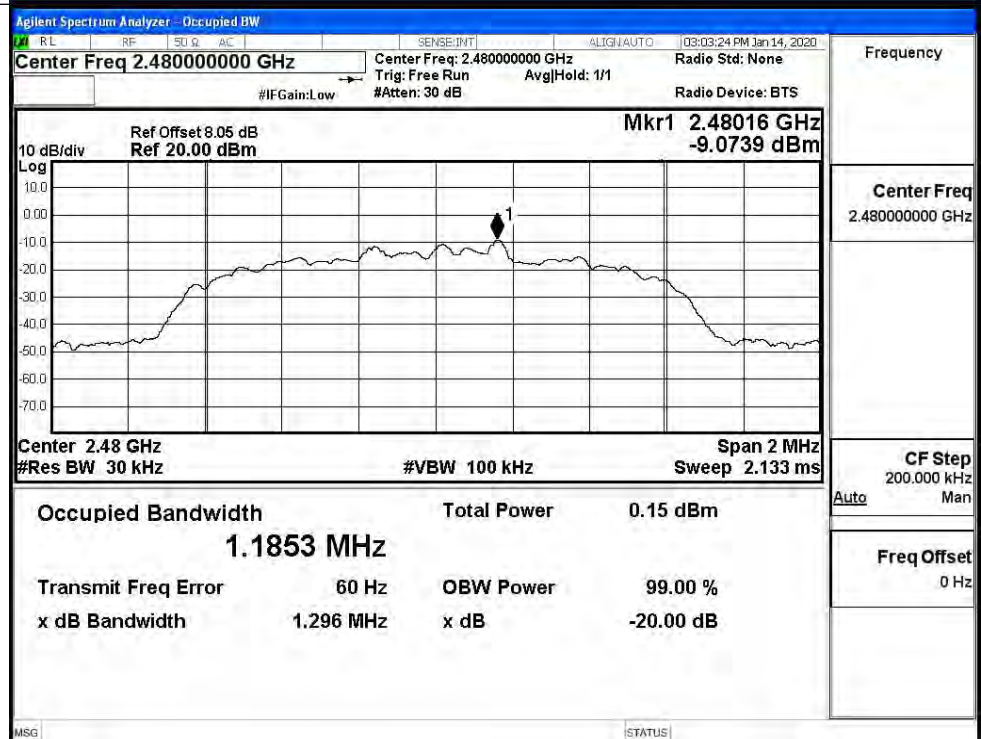
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

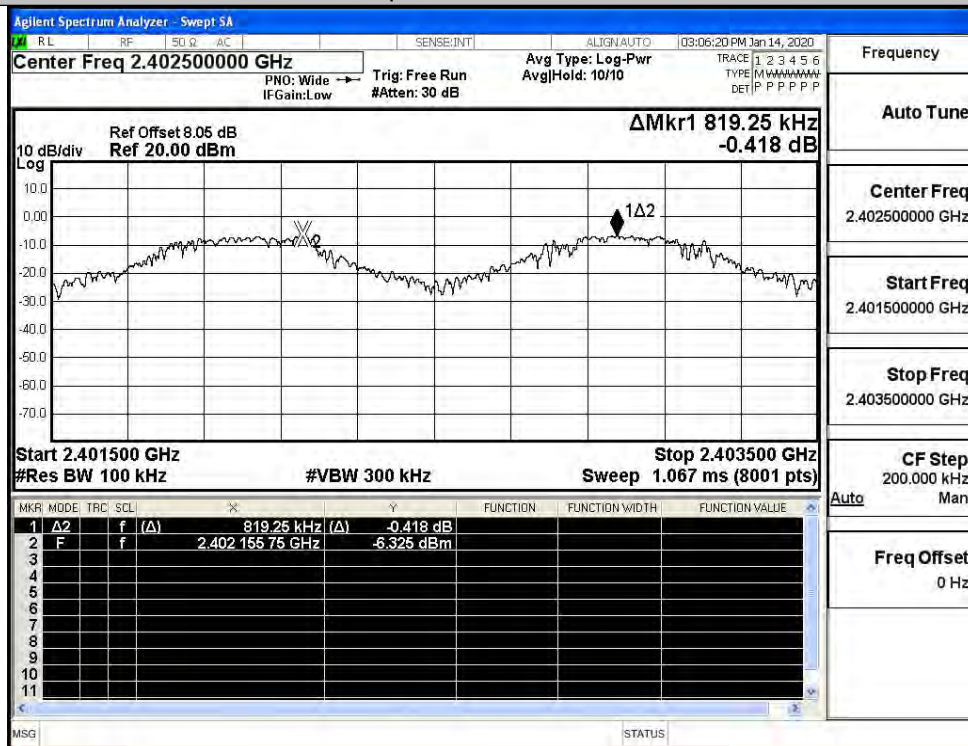


A.3 Carrier Frequency Separation

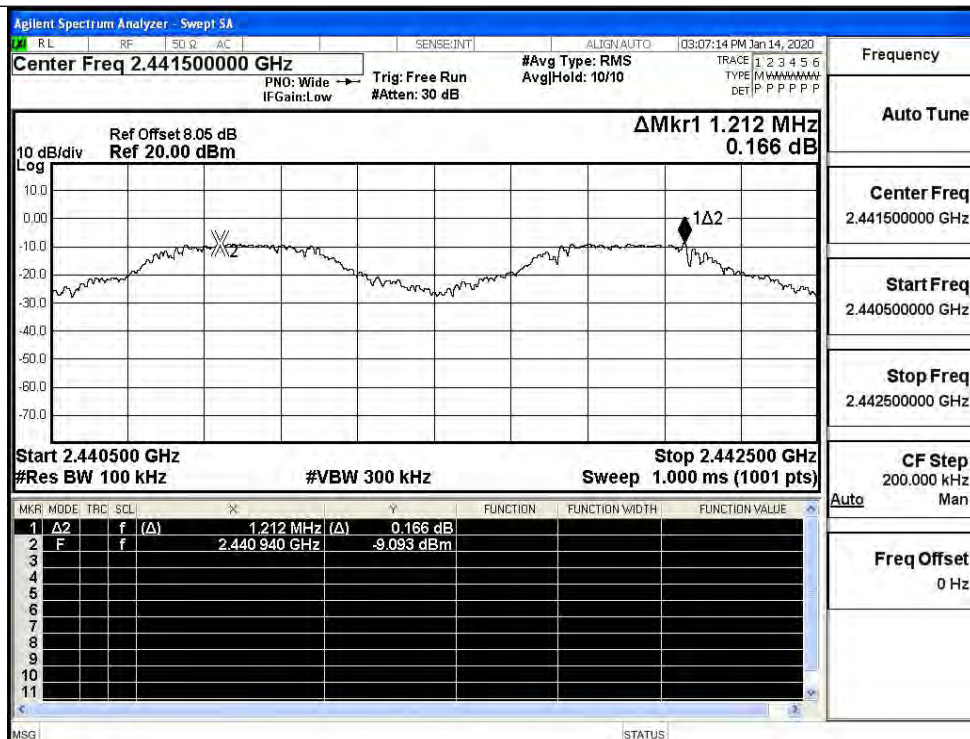
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.819	0.688	PASS
	MCH	1.212	0.688	PASS
	HCH	0.950	0.688	PASS
$\pi/4$ DQPSK	LCH	1.034	0.877	PASS
	MCH	1.218	0.877	PASS
	HCH	1.066	0.877	PASS
8DPSK	LCH	1.214	0.867	PASS
	MCH	1.282	0.867	PASS
	HCH	1.120	0.867	PASS

Test Graphs

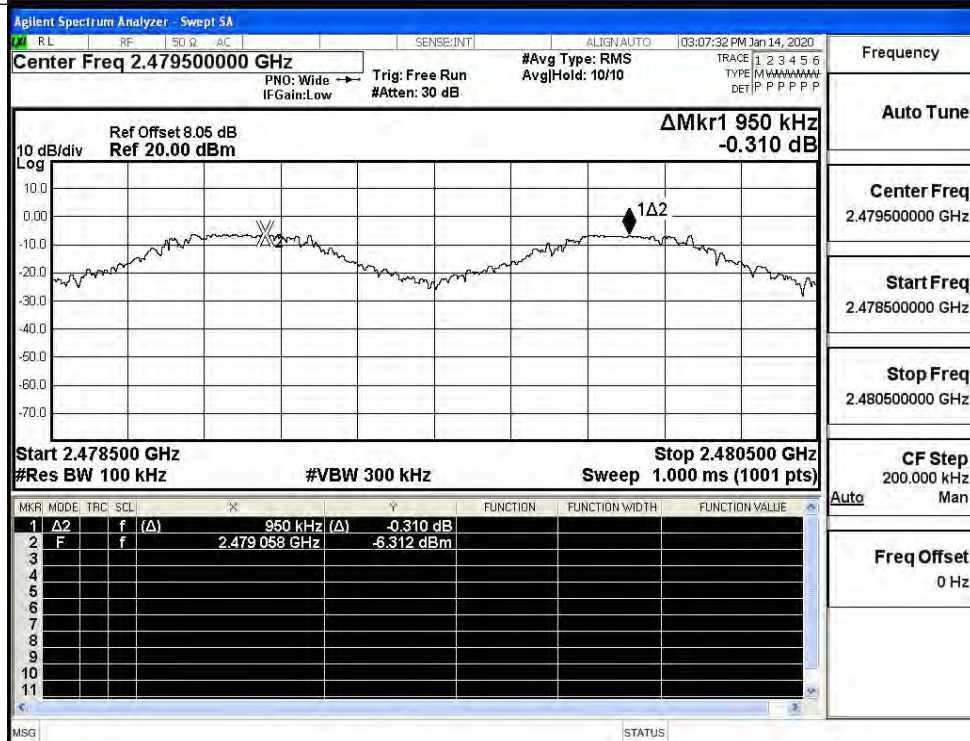
GFSK/LCH



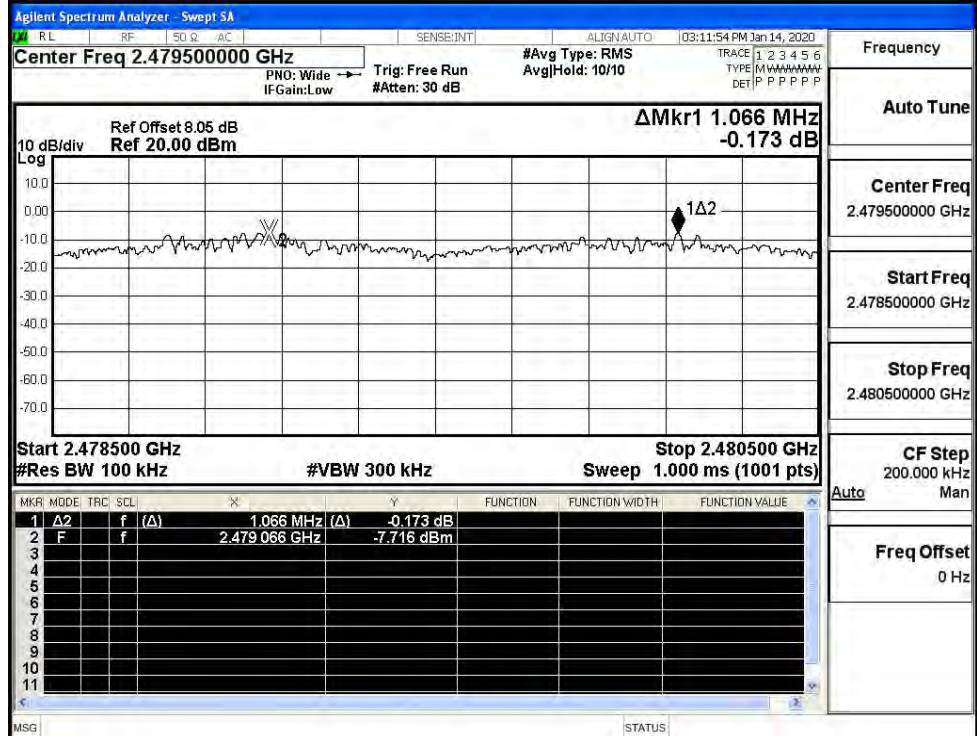
GFSK/MCH



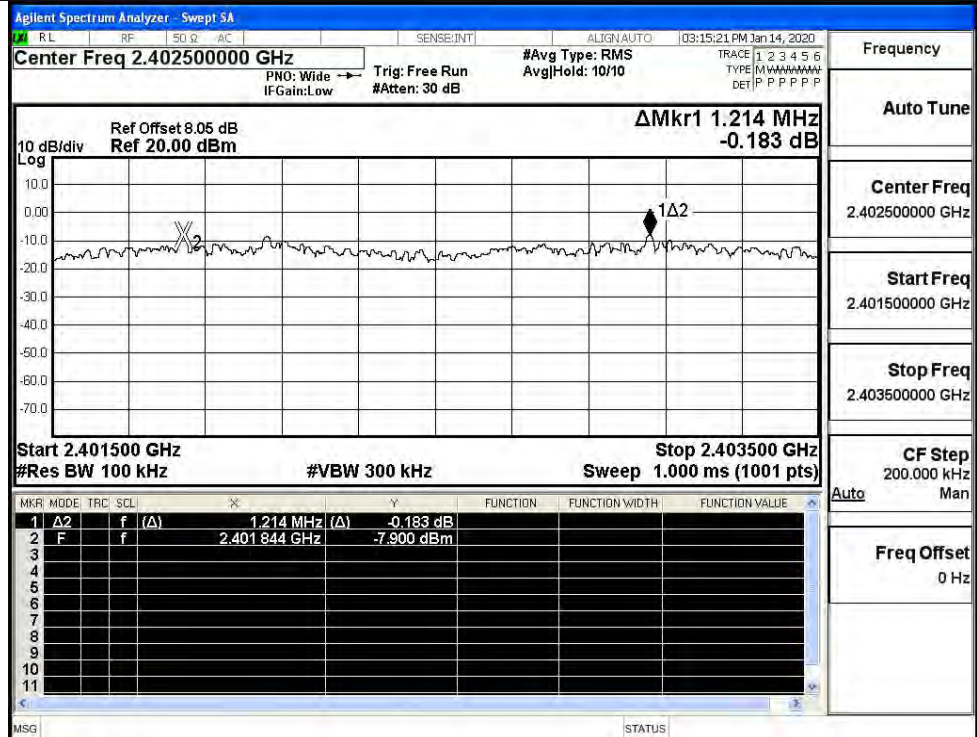
GFSK/HCH



$\pi/4$ DQPSK/HCH



8DPSK/LCH



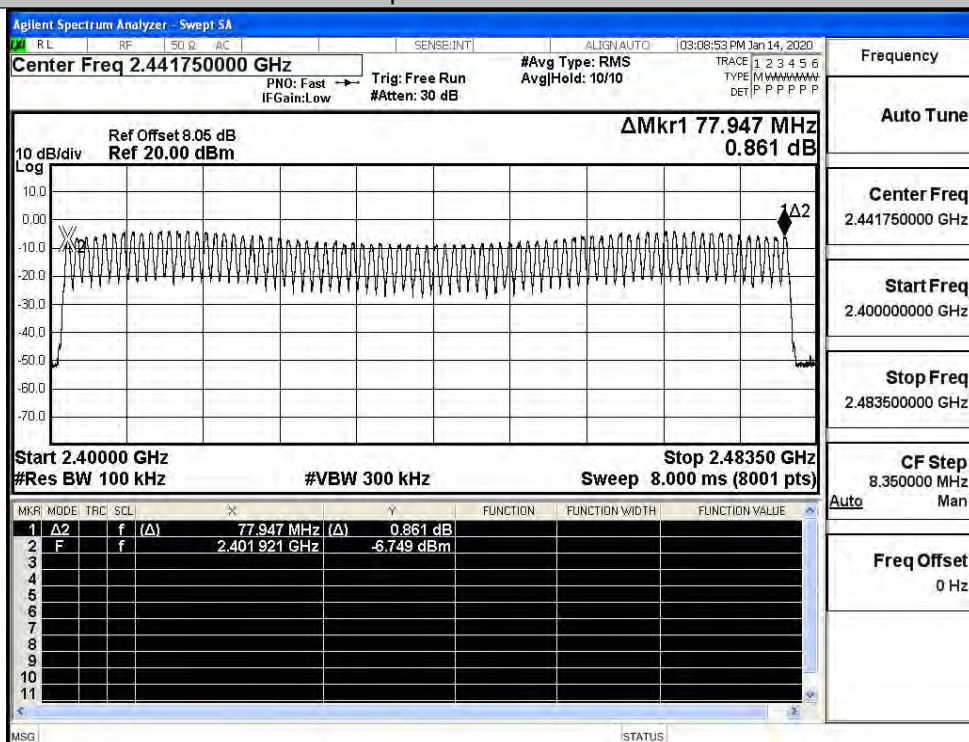
8DPSK/MCH	Agilent Spectrum Analyzer - Swept SA RL RF 50 Ω AC SENSE:INT ALIGN:AUTO 03:20:26 PM Jan 14, 2020 Center Freq 2.441500000 GHz PNO: Wide IF Gain:Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS Avg/Hold: 10/10 TRACE 1 2 3 4 5 6 TYPE [M W H A W H A W] DET [P P P P P P] Ref Offset 8.05 dB Ref 20.00 dBm ΔMkr1 1.282 MHz 1.814 dB 10 dB/div Log Start 2.4405000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts) Stop 2.4425000 GHz <table><tr><th>MKR</th><th>MODE</th><th>TRC</th><th>SCL</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>Δ2</td><td>f</td><td>(Δ)</td><td>1.282 MHz</td><td>(Δ)</td><td>1.814 dB</td><td></td><td></td></tr><tr><td>2</td><td>F</td><td>f</td><td></td><td>2.440882 GHz</td><td></td><td>-11.308 dBm</td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> MSG STATUS Frequency Auto Tune Center Freq 2.441500000 GHz Start Freq 2.440500000 GHz Stop Freq 2.442500000 GHz CF Step 200.000 kHz Man Auto Freq Offset 0 Hz	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ2	f	(Δ)	1.282 MHz	(Δ)	1.814 dB			2	F	f		2.440882 GHz		-11.308 dBm			3									4									5									6									7									8									9									10									11								
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8DPSK/HCH	Agilent Spectrum Analyzer - Swept SA RL RF 50 Ω AC SENSE:INT ALIGN:AUTO 03:17:24 PM Jan 14, 2020 Center Freq 2.479500000 GHz PNO: Wide IF Gain:Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS Avg/Hold: 10/10 TRACE 1 2 3 4 5 6 TYPE [M W H A W H A W] DET [P P P P P P] Ref Offset 8.05 dB Ref 20.00 dBm ΔMkr1 1.120 MHz -3.274 dB 10 dB/div Log Start 2.4785000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts) Stop 2.4805000 GHz <table><tr><th>MKR</th><th>MODE</th><th>TRC</th><th>SCL</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>Δ2</td><td>f</td><td>(Δ)</td><td>1.120 MHz</td><td>(Δ)</td><td>-3.274 dB</td><td></td><td></td></tr><tr><td>2</td><td>F</td><td>f</td><td></td><td>2.478840 GHz</td><td></td><td>-7.091 dBm</td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> MSG STATUS Frequency Auto Tune Center Freq 2.479500000 GHz Start Freq 2.478500000 GHz Stop Freq 2.480500000 GHz CF Step 200.000 kHz Man Auto Freq Offset 0 Hz	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ2	f	(Δ)	1.120 MHz	(Δ)	-3.274 dB			2	F	f		2.478840 GHz		-7.091 dBm			3									4									5									6									7									8									9									10									11								
	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																																																																																				
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A.4 Hopping Channel Number

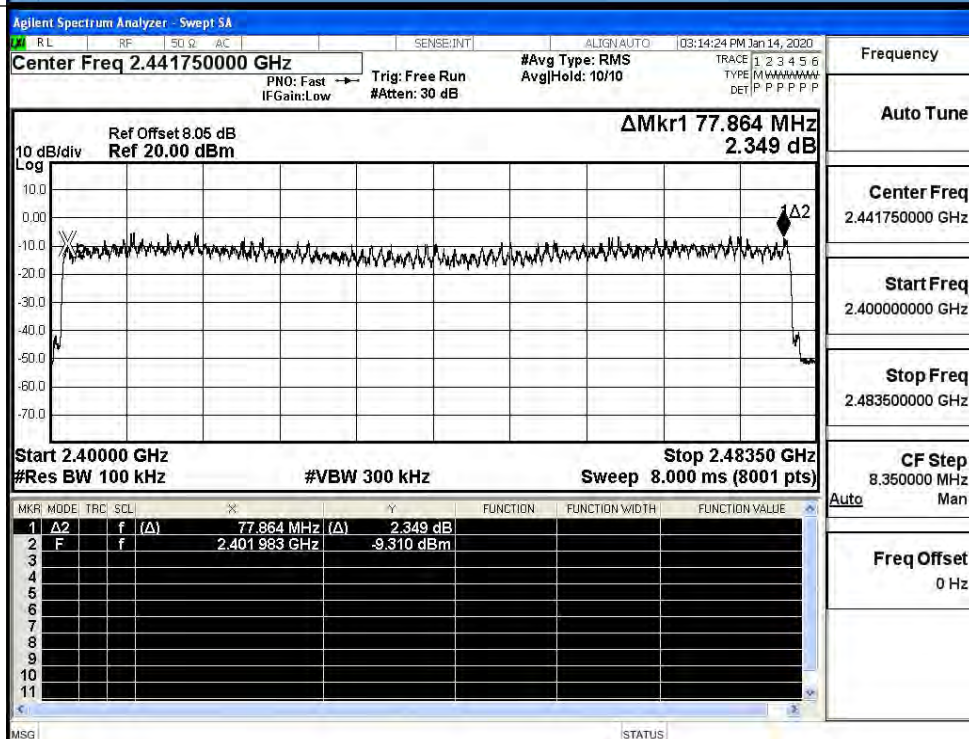
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
π/4DQPSK	Hop	79	>=15	PASS
8DPSK	Hop	79	>=15	PASS

Test Graphs

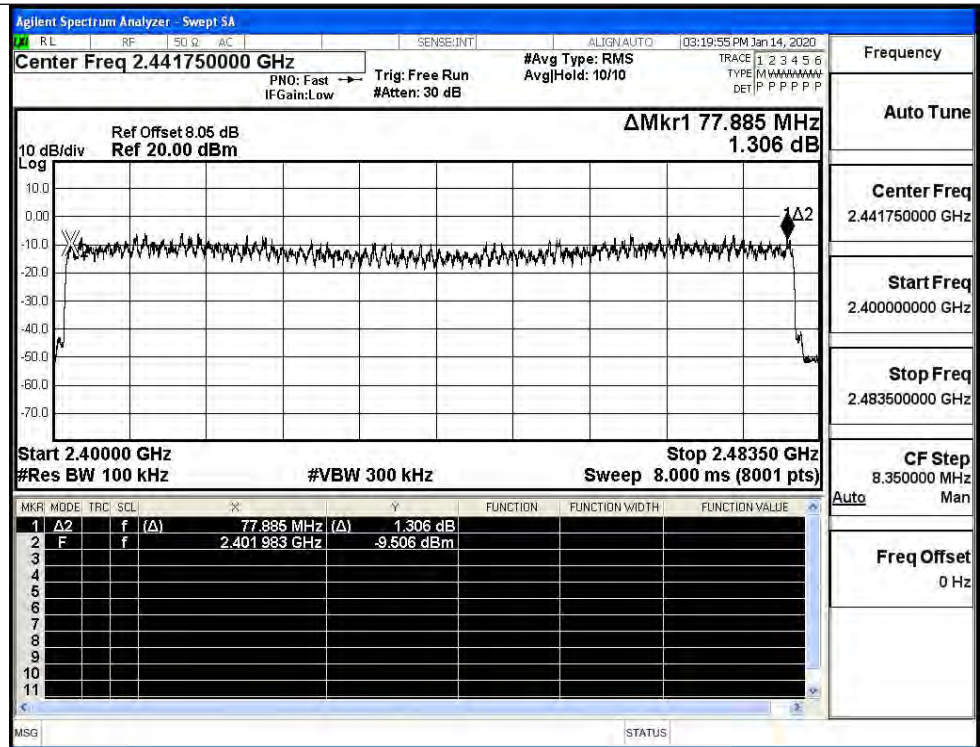
GFSK/Hop



π/4DQPSK/Hop



8DPSK/Hop

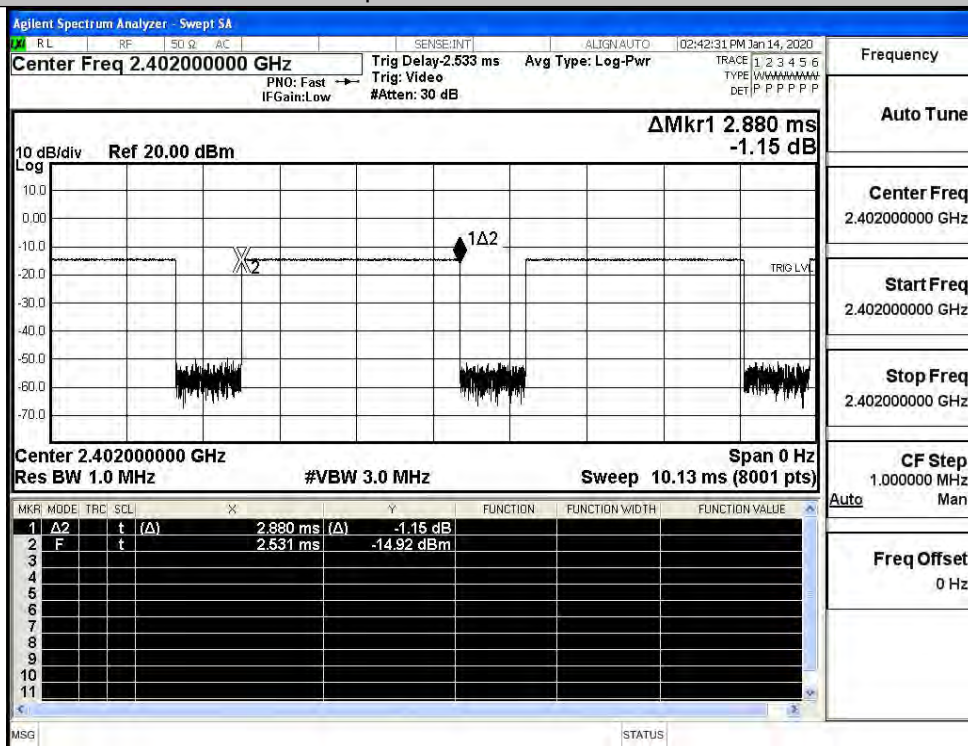


A.5 Dwell Time

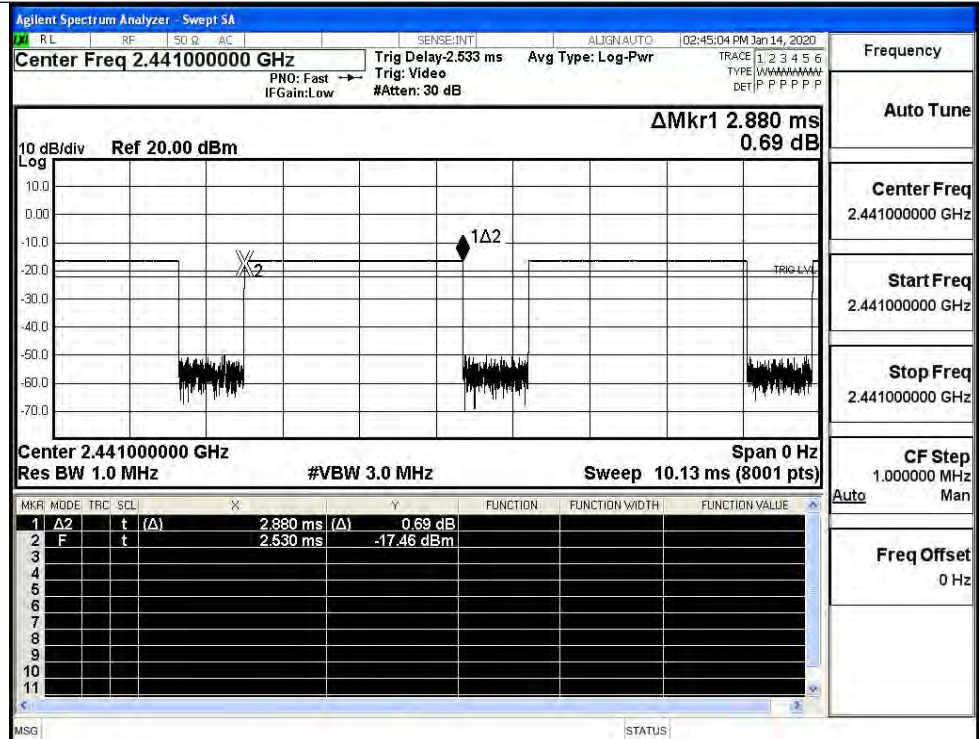
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.88	106.7	0.308	0.4	PASS
	3DH5	MCH	2.88	106.7	0.308	0.4	PASS
	3DH5	HCH	2.88	106.7	0.308	0.4	PASS

Test Graphs

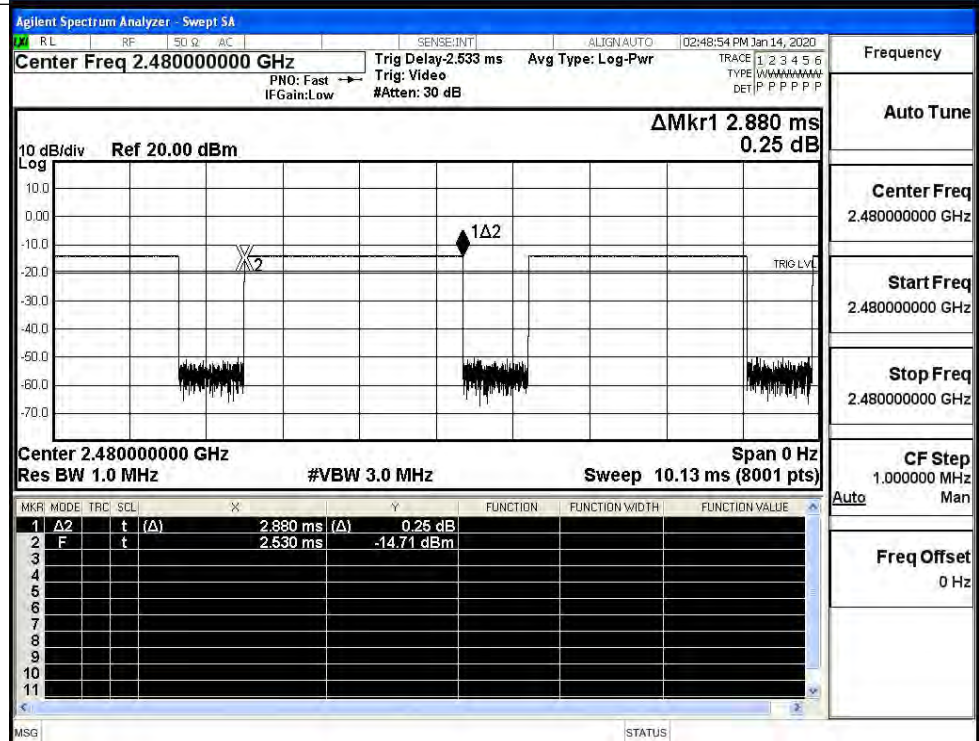
GFSK_DH5/LCH

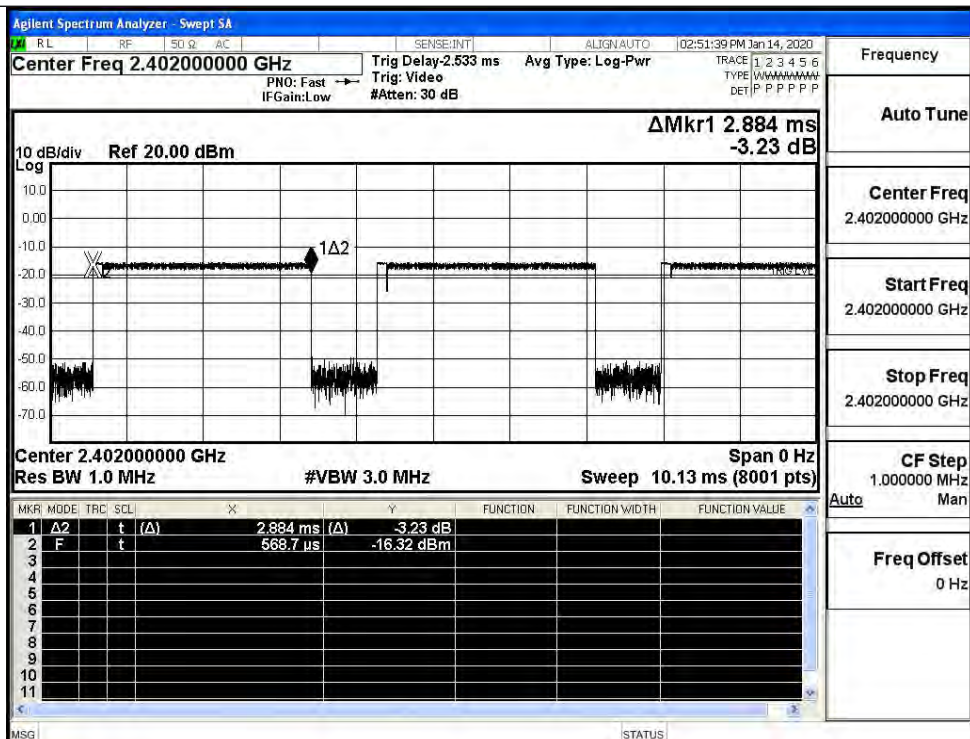
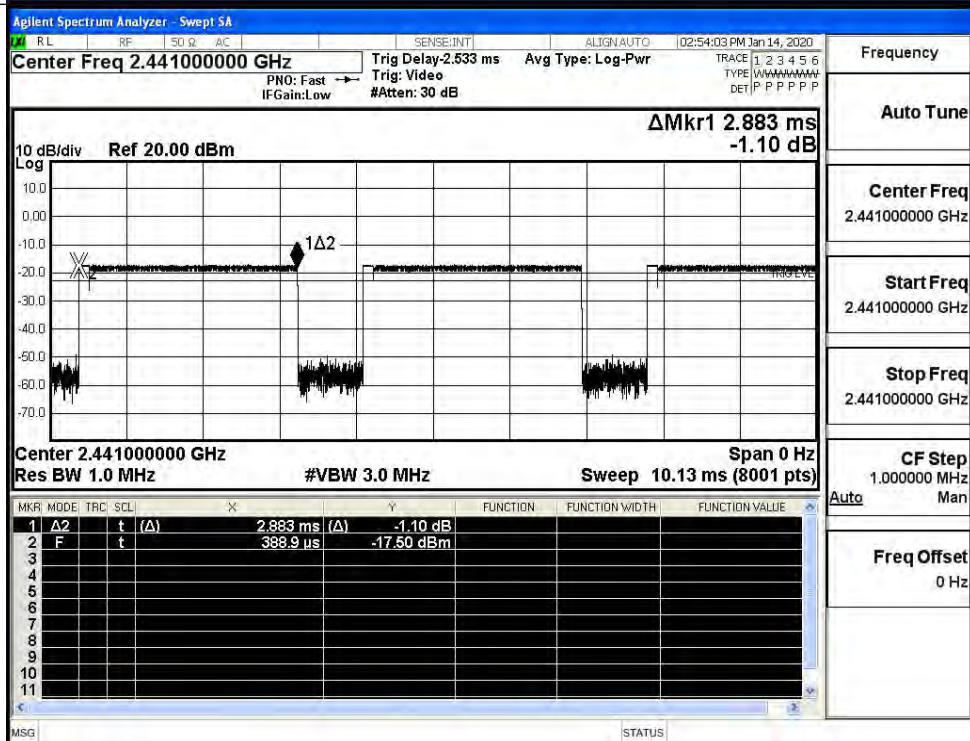


GFSK_DH5/MCH

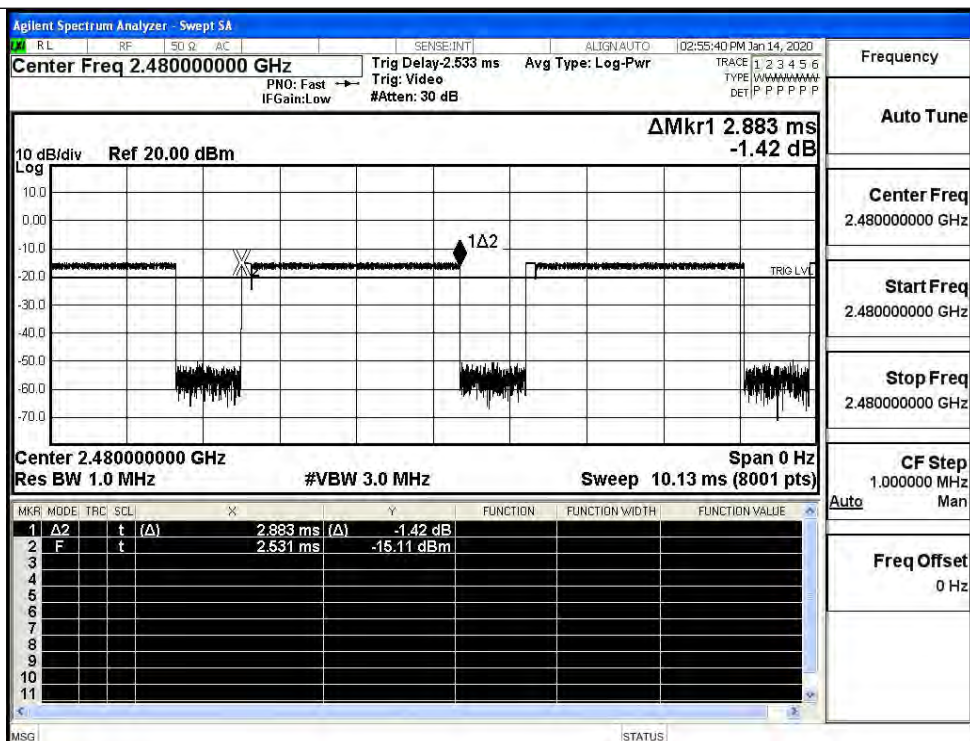


GFSK_DH5/HCH

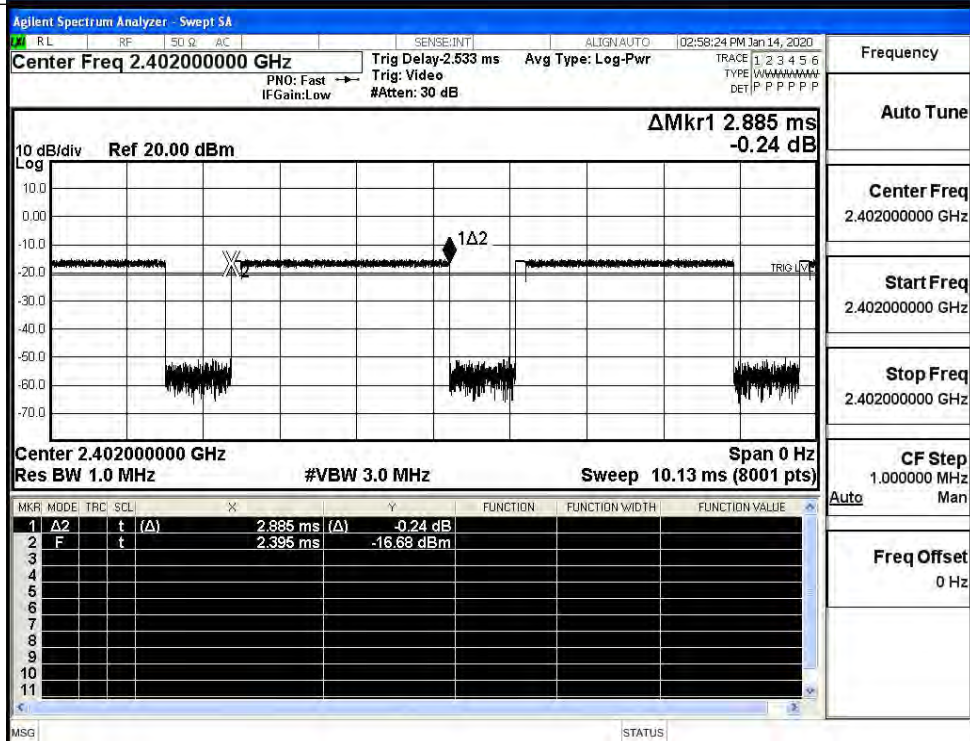


$\pi/4$ DQPSK
_2DH5/LCH $\pi/4$ DQPSK
_2DH5/MCH

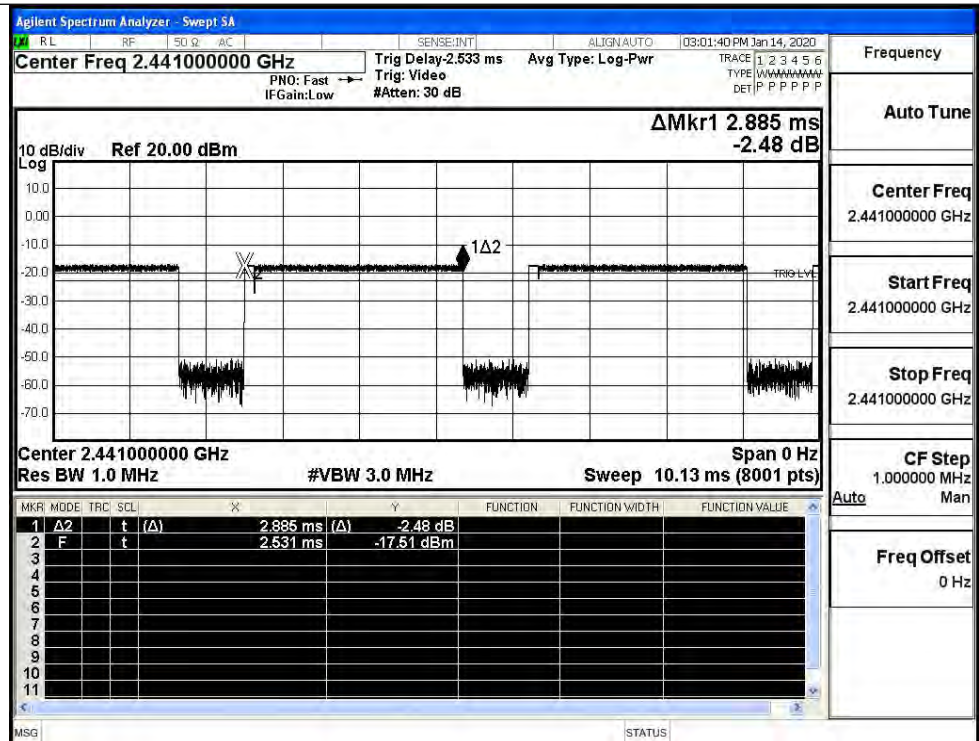
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_2DH5/HCH



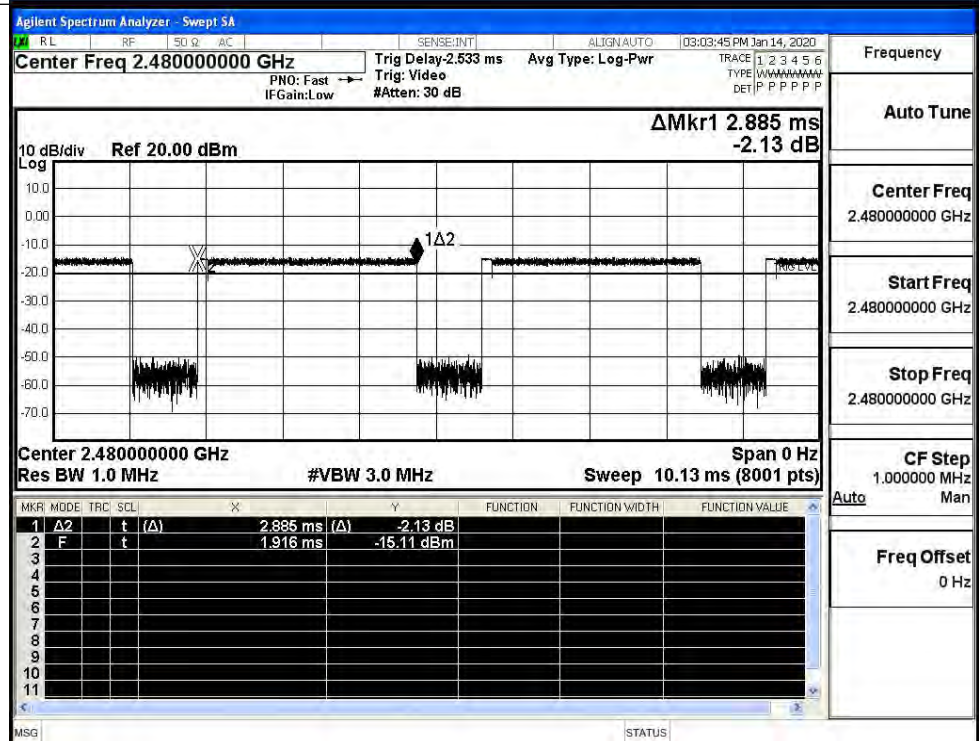
8DPSK _3DH5/LCH



8DPSK_3DH5/MCH



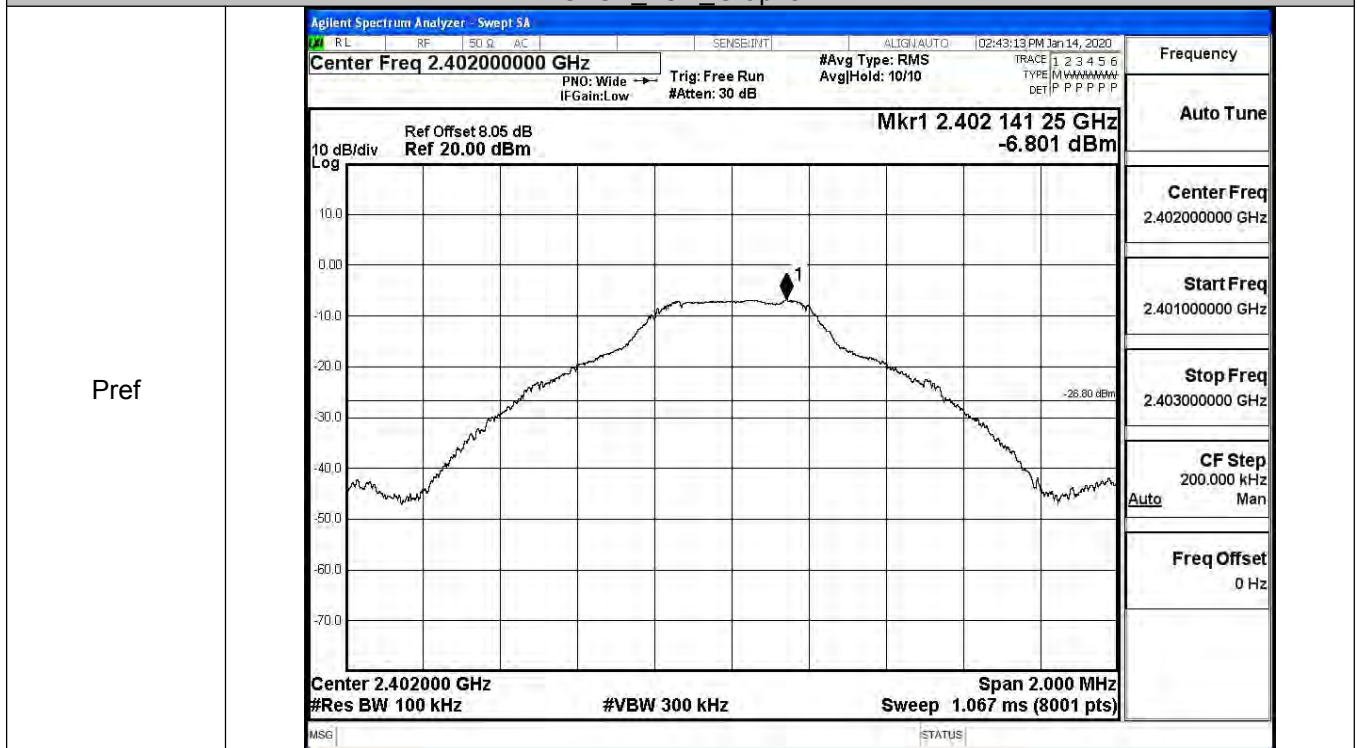
8DPSK_3DH5/HCH



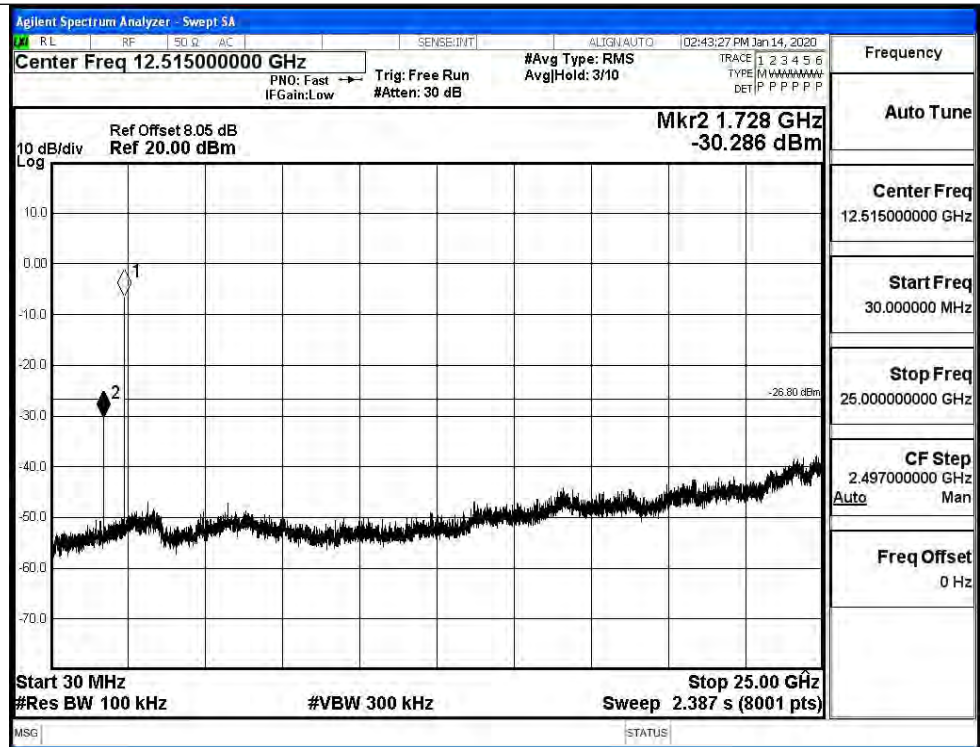
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-6.801	-30.286	-26.801	PASS
	MCH	-8.341	-37.708	-28.341	PASS
	HCH	-5.968	-36.060	-25.968	PASS
$\pi/4$ DQPSK	LCH	-7.766	-37.987	-27.766	PASS
	MCH	-9.625	-37.710	-29.625	PASS
	HCH	-7.031	-38.106	-27.031	PASS
8DPSK	LCH	-7.827	-37.538	-27.827	PASS
	MCH	-9.361	-37.124	-29.361	PASS
	HCH	-7.729	-37.458	-27.729	PASS

GFSK LCH Graphs

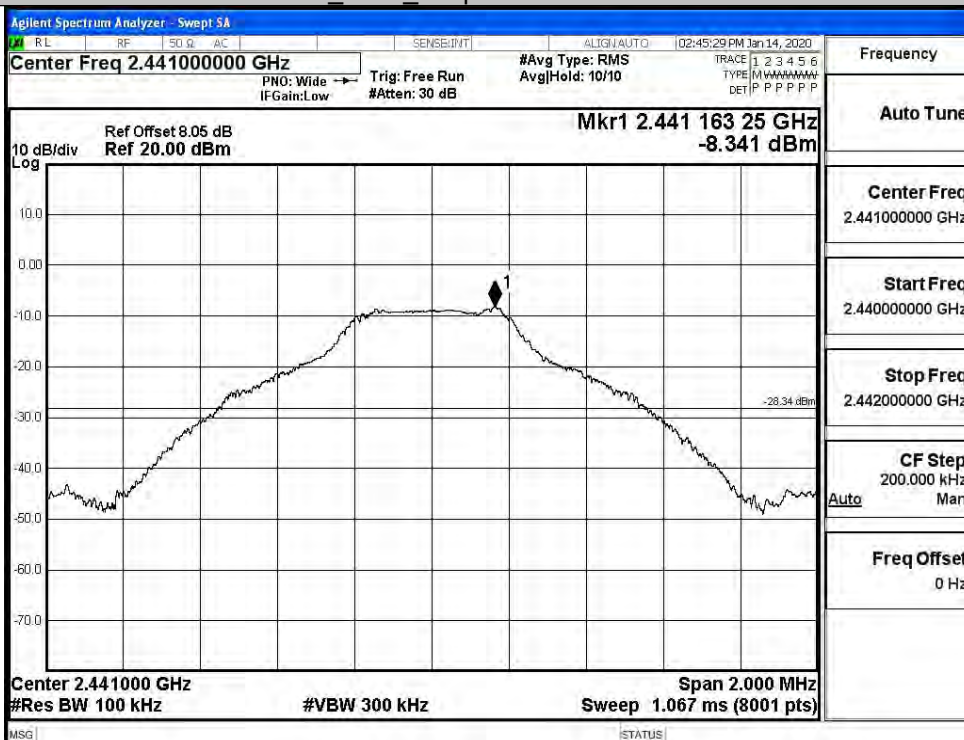


P_{uw}

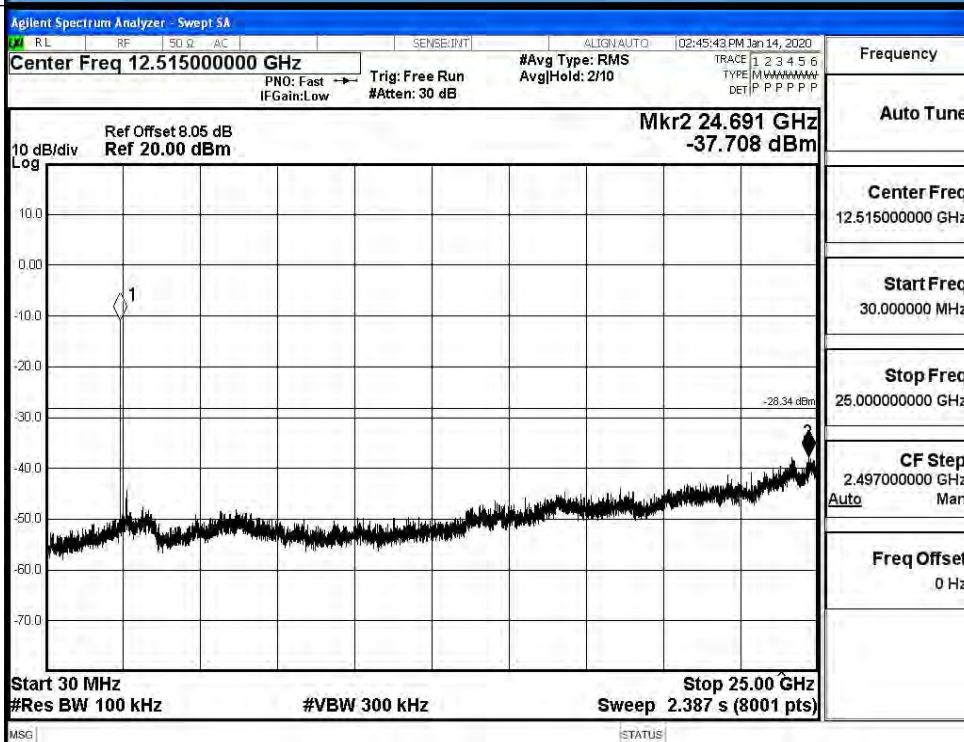


GFSK MCH_Graphs

Pref

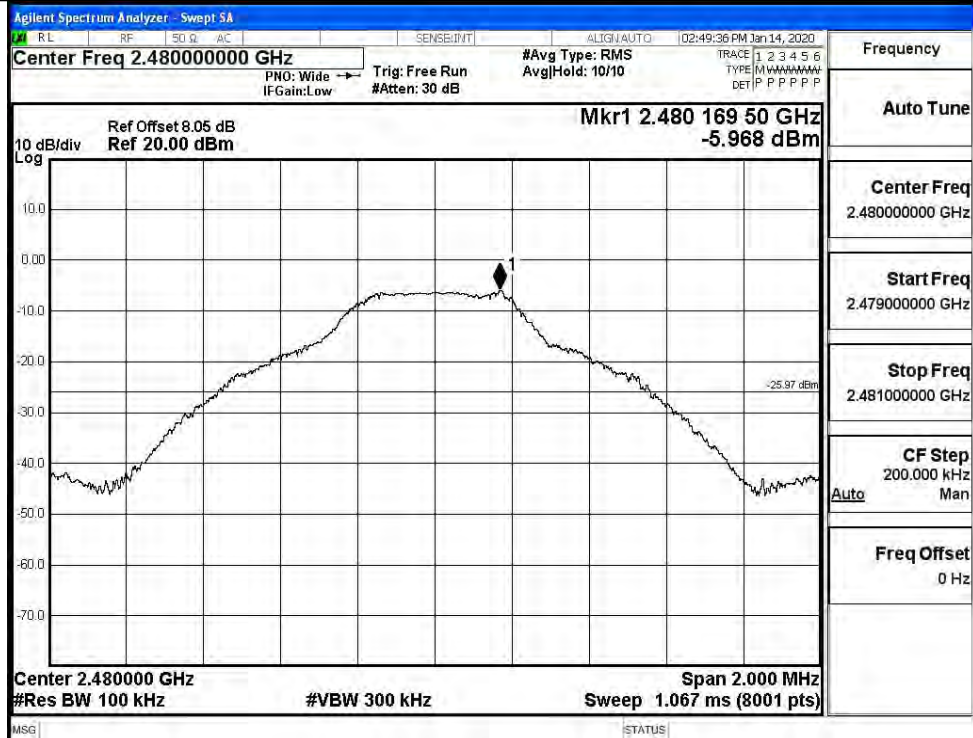


Puw

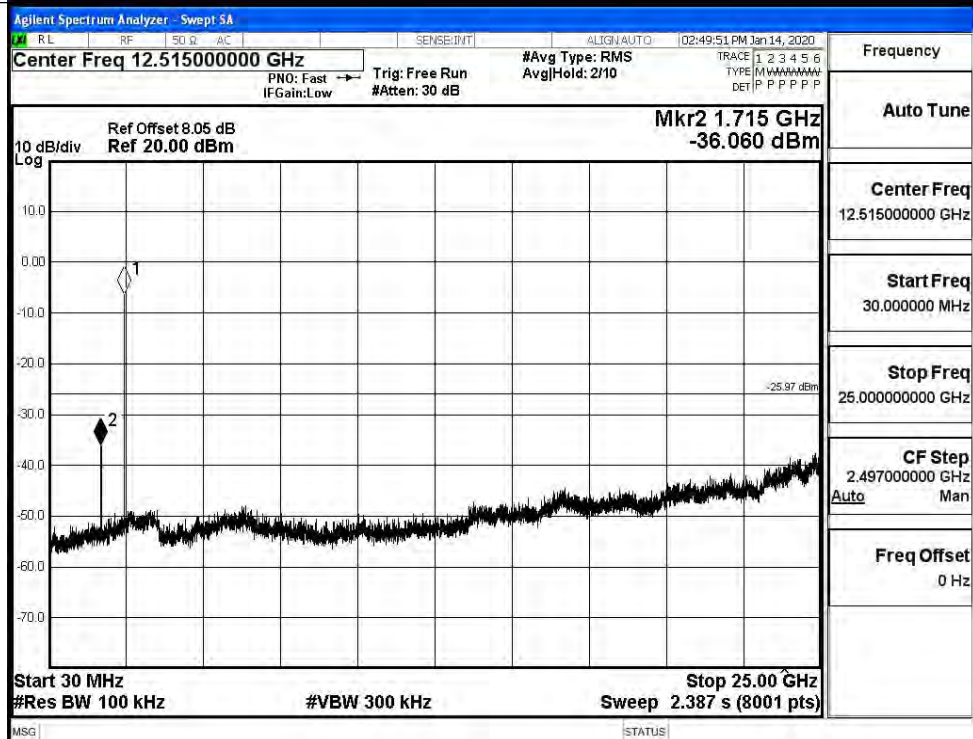


GFSK HCH Graphs

Pref

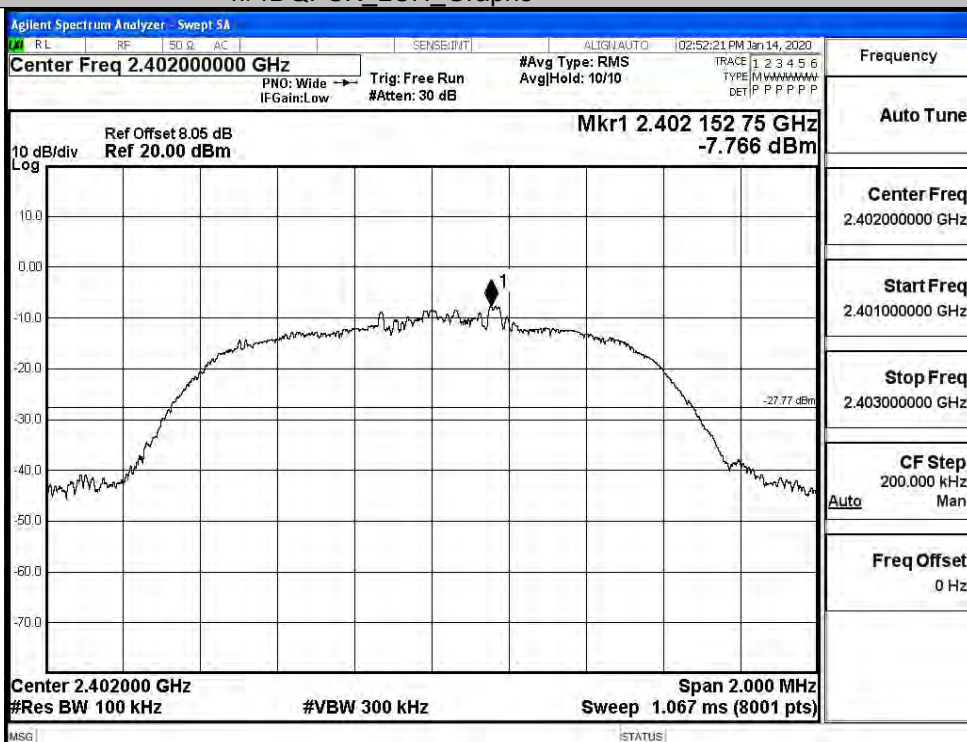


Puw

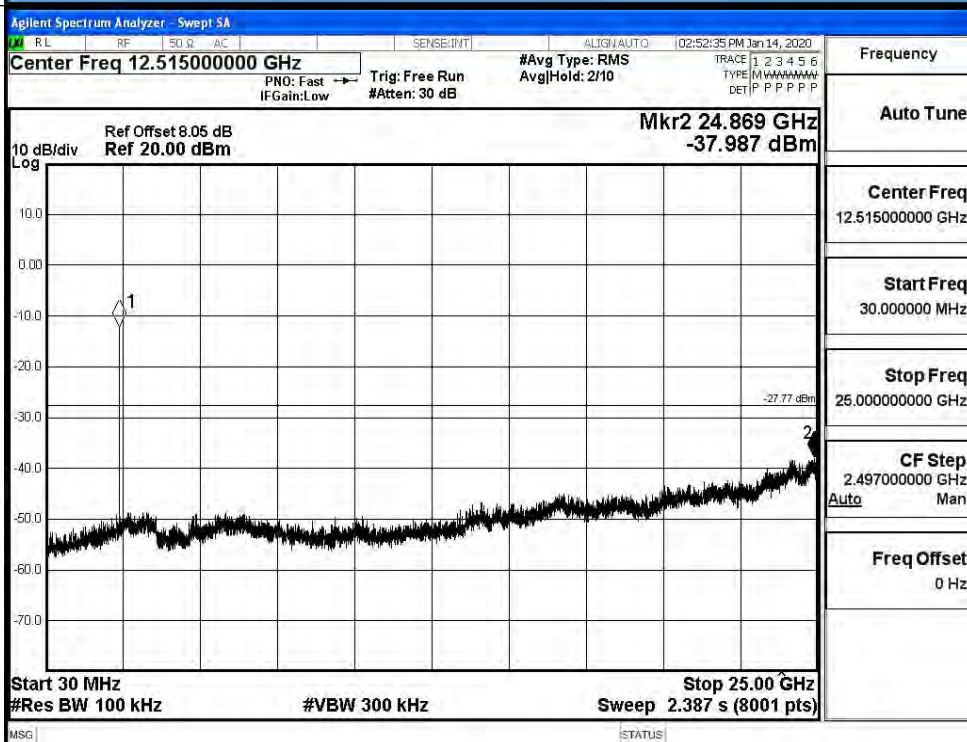


$\pi/4$ DQPSK LCH_Graphs

Pref

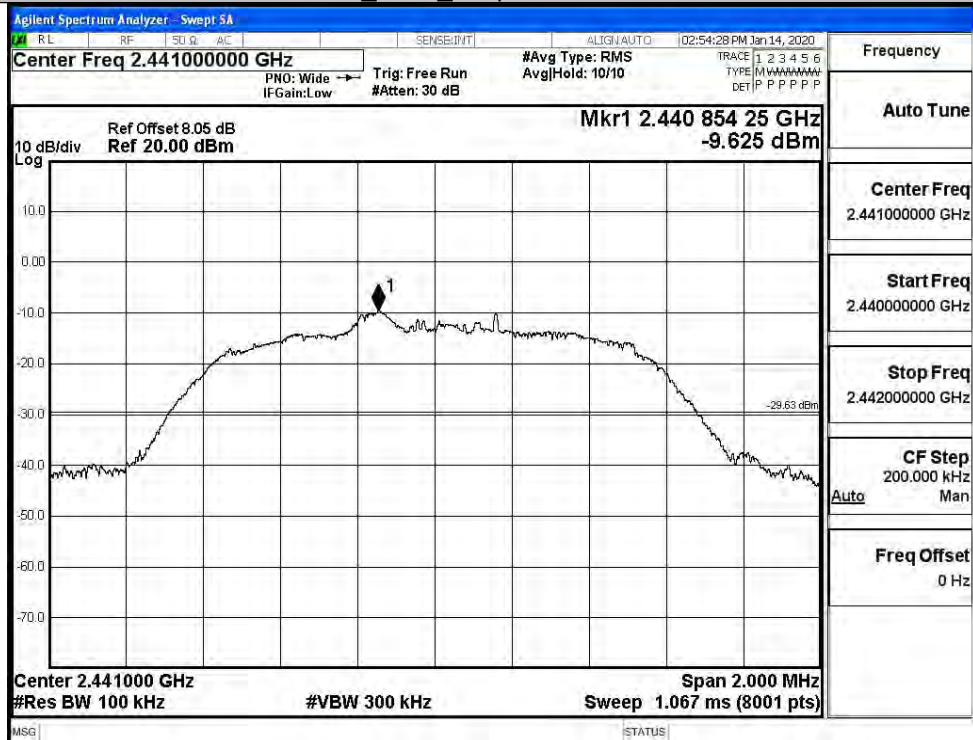


Puw

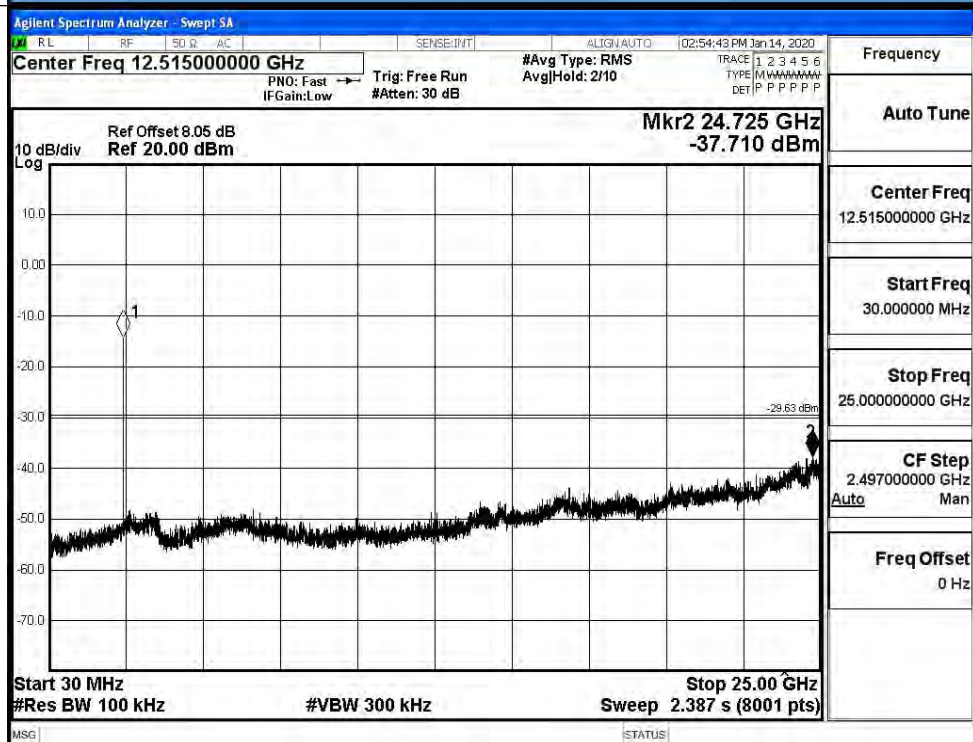


$\pi/4$ DQPSK_MCH_Graphs

Pref

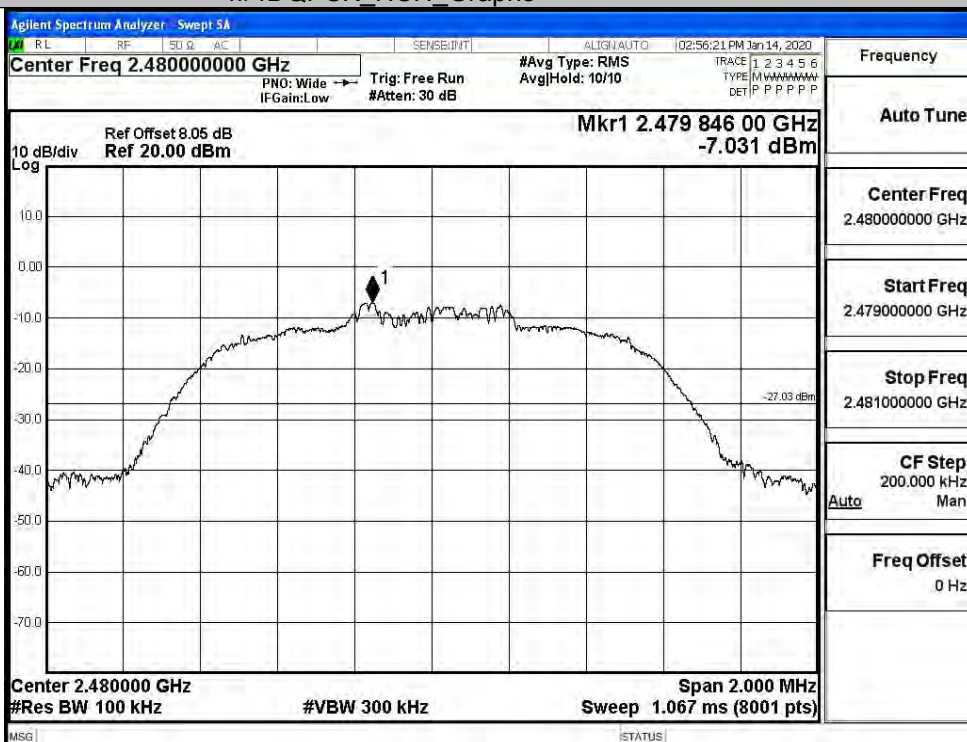


Puw

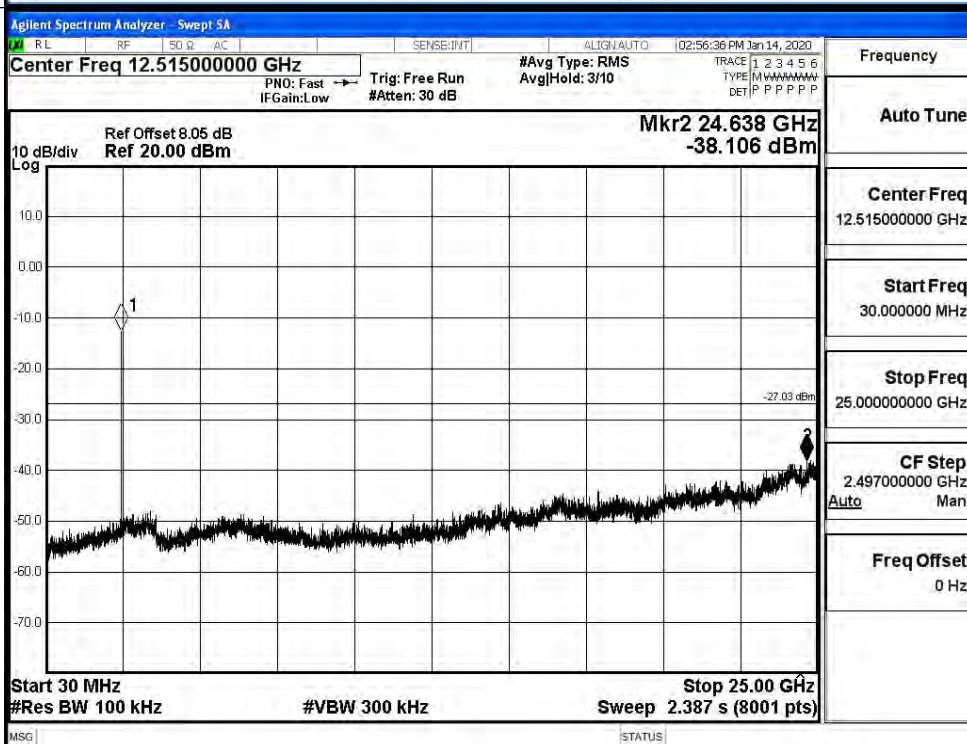


$\pi/4$ DQPSK HCH_Graphs

Pref

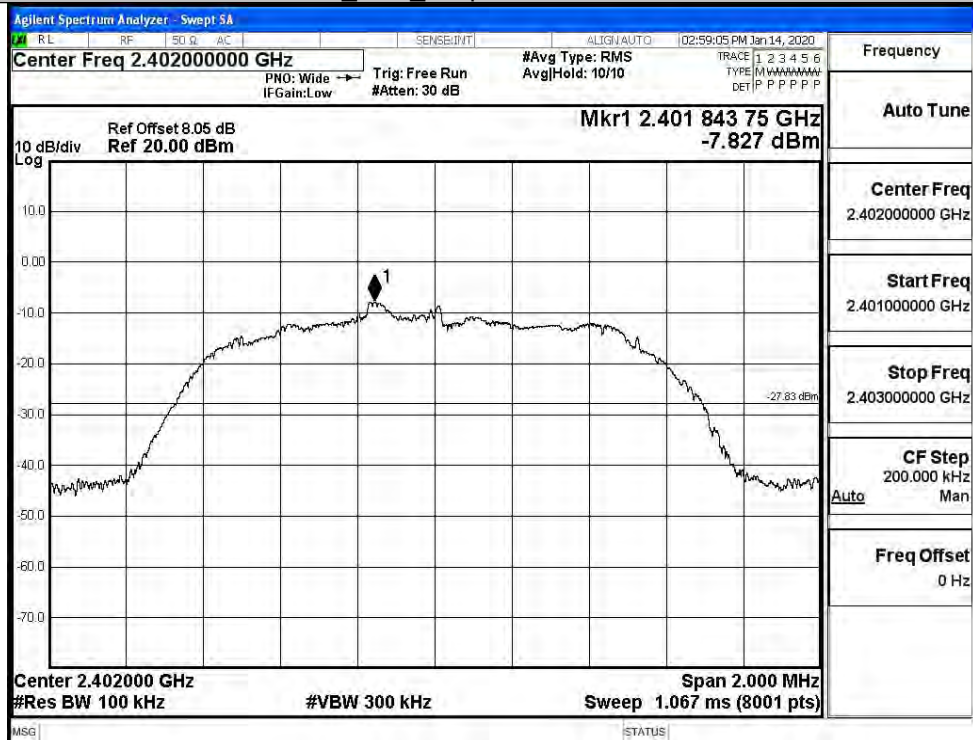


Puw

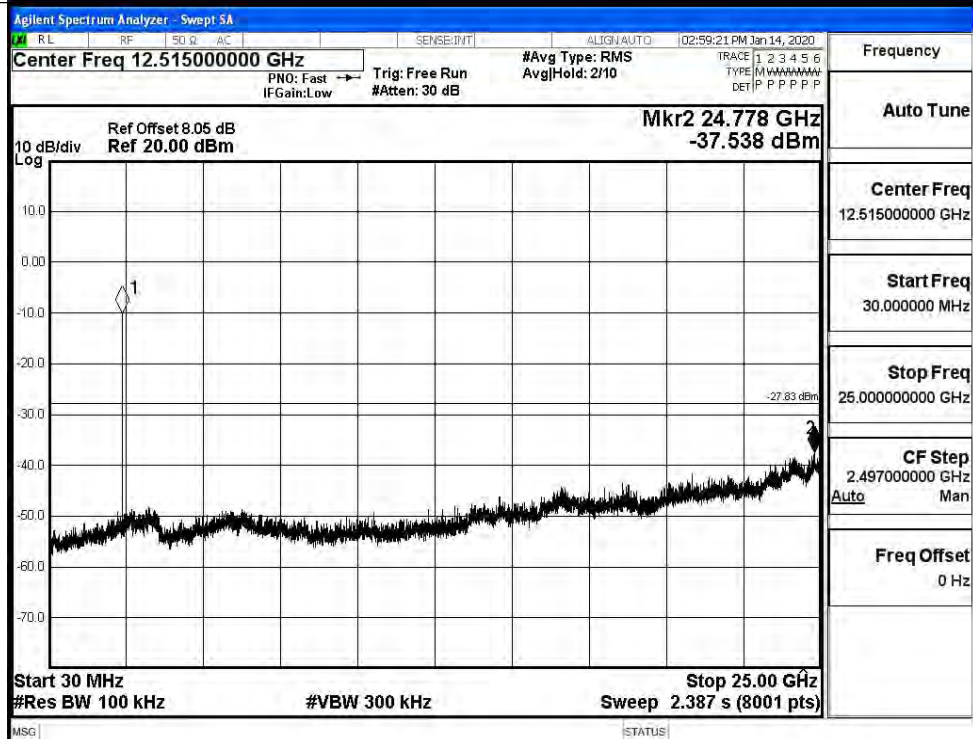


8DPSK_LCH_Graphs

Pref

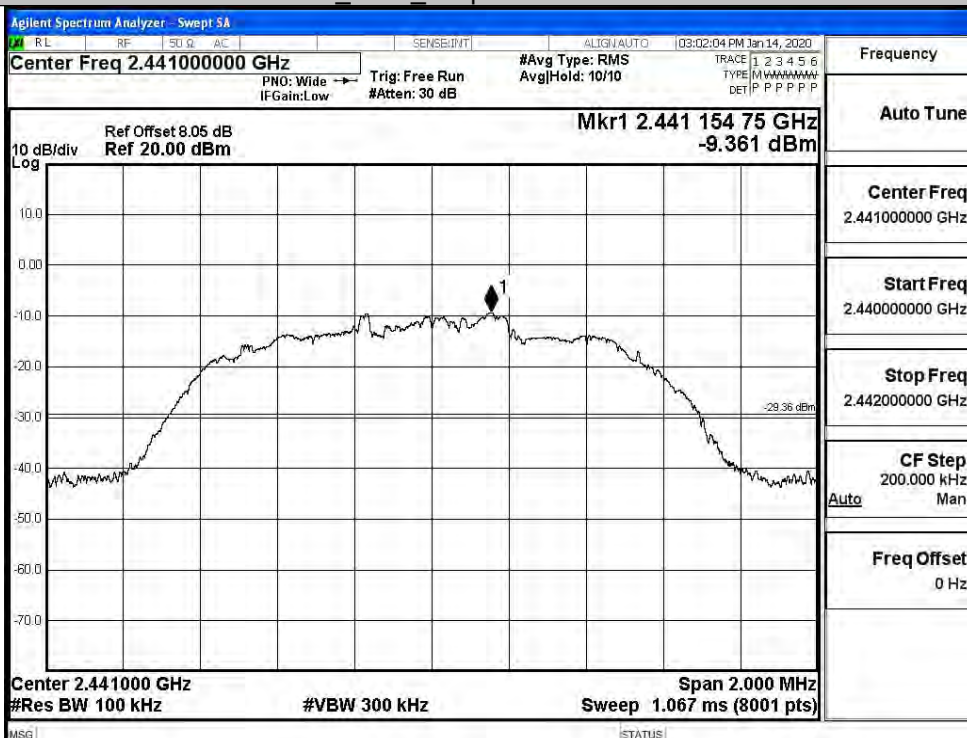


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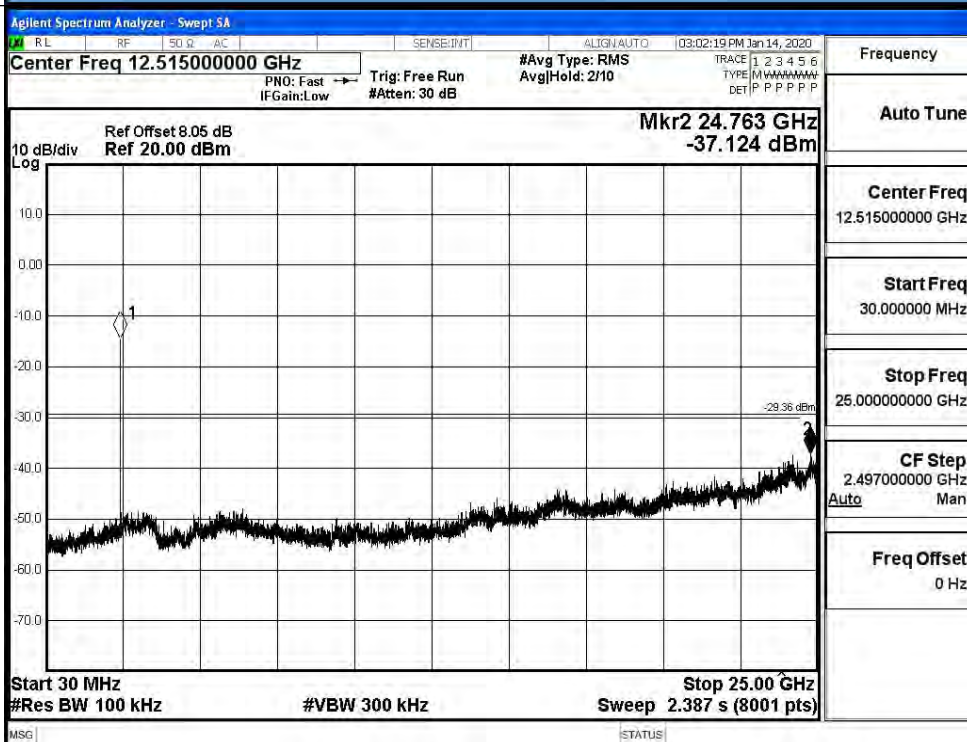


8DPSK MCH_Graphs

Pref

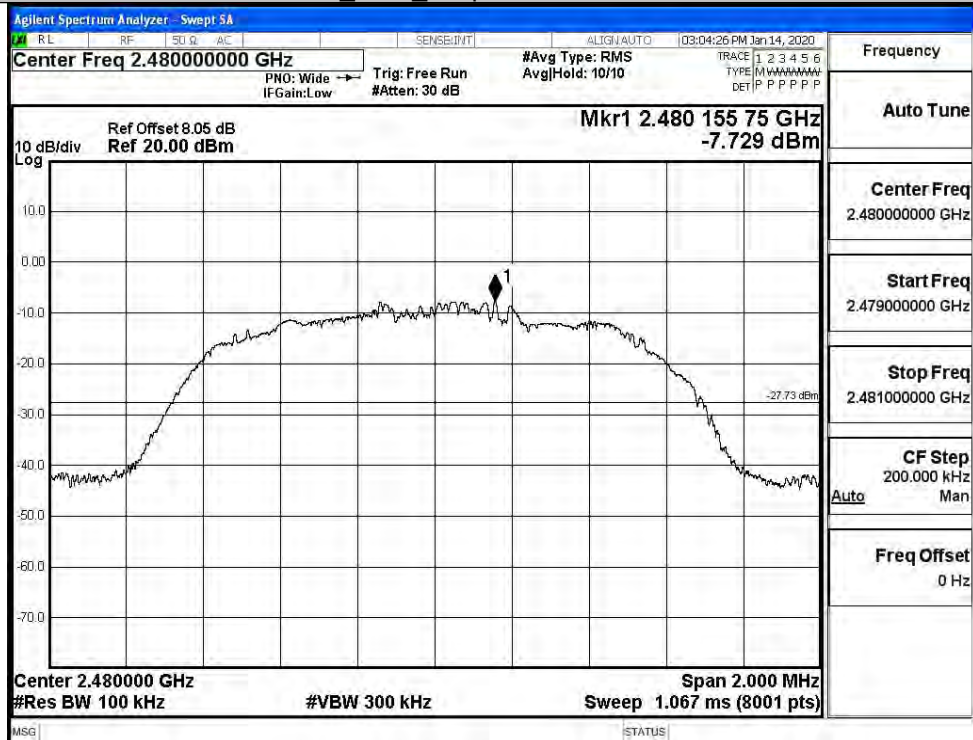


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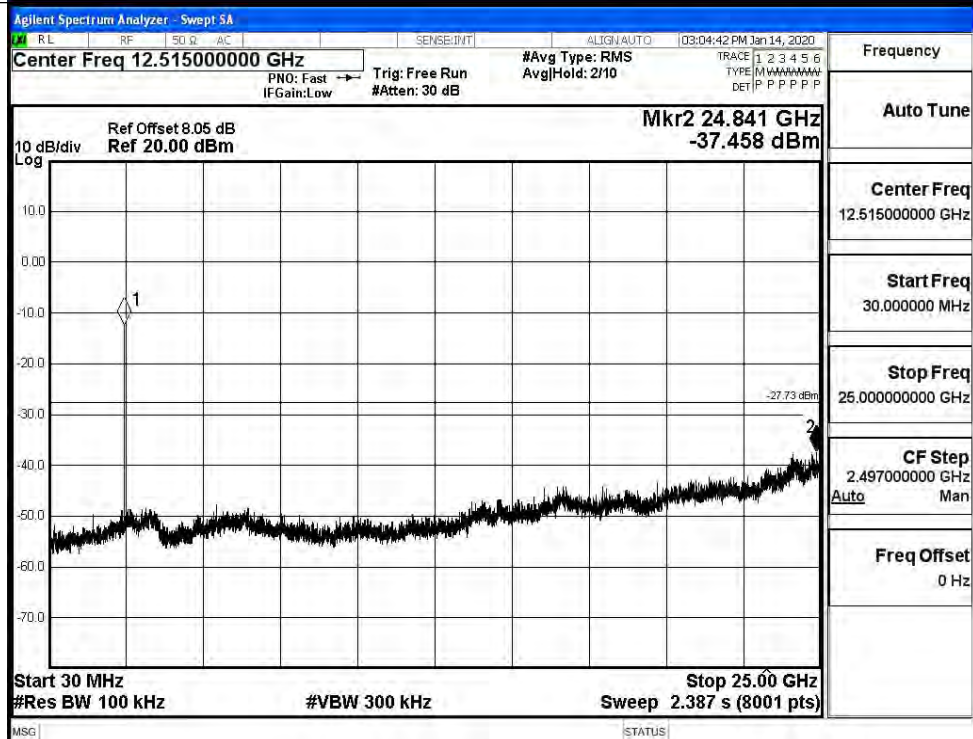


8DPSK_HCH_Graphs

Pref



Puw

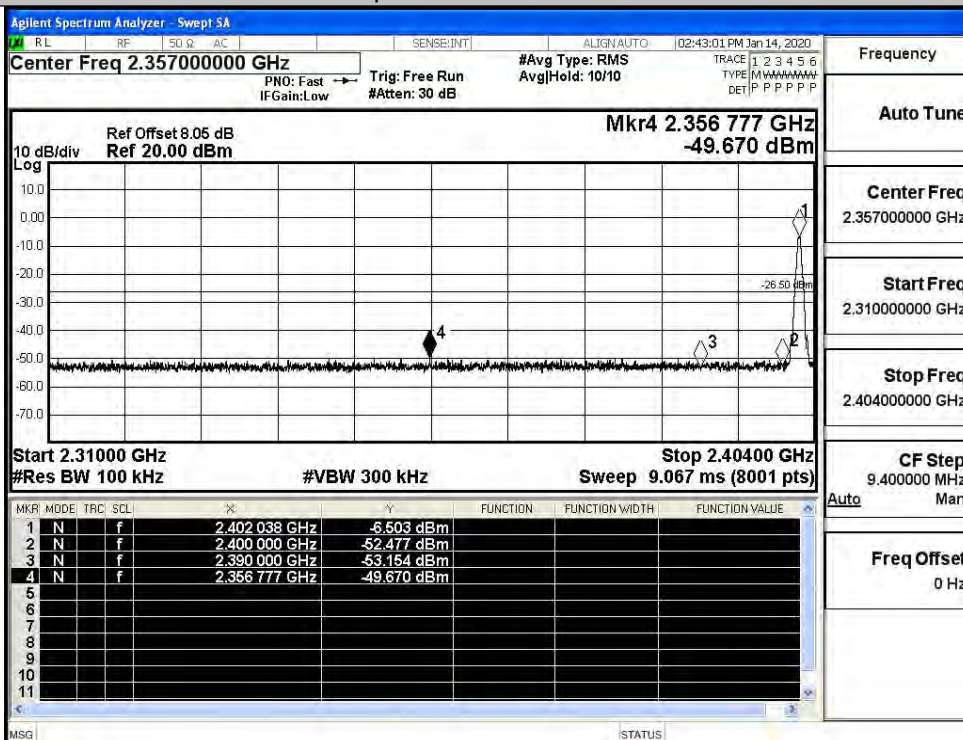


A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-6.503	Off	-49.670	-26.5	PASS
			-3.604	On	-48.780	-23.6	PASS
	HCH	2480	-5.917	Off	-49.075	-25.92	PASS
			-4.252	On	-49.263	-24.25	PASS
$\pi/4$ DQPSK	LCH	2402	-7.871	Off	-49.609	-27.87	PASS
			-5.406	On	-48.830	-25.41	PASS
	HCH	2480	-6.932	Off	-49.223	-26.93	PASS
			-5.874	On	-48.591	-25.87	PASS
8DPSK	LCH	2402	-7.889	Off	-49.392	-27.89	PASS
			-5.633	On	-49.027	-25.63	PASS
	HCH	2480	-7.676	Off	-48.793	-27.68	PASS
			-5.950	On	-48.402	-25.95	PASS

Test Graphs

GFSK/LCH/No Hop



Frequency

Auto Tune

Center Freq
2.357000000 GHz

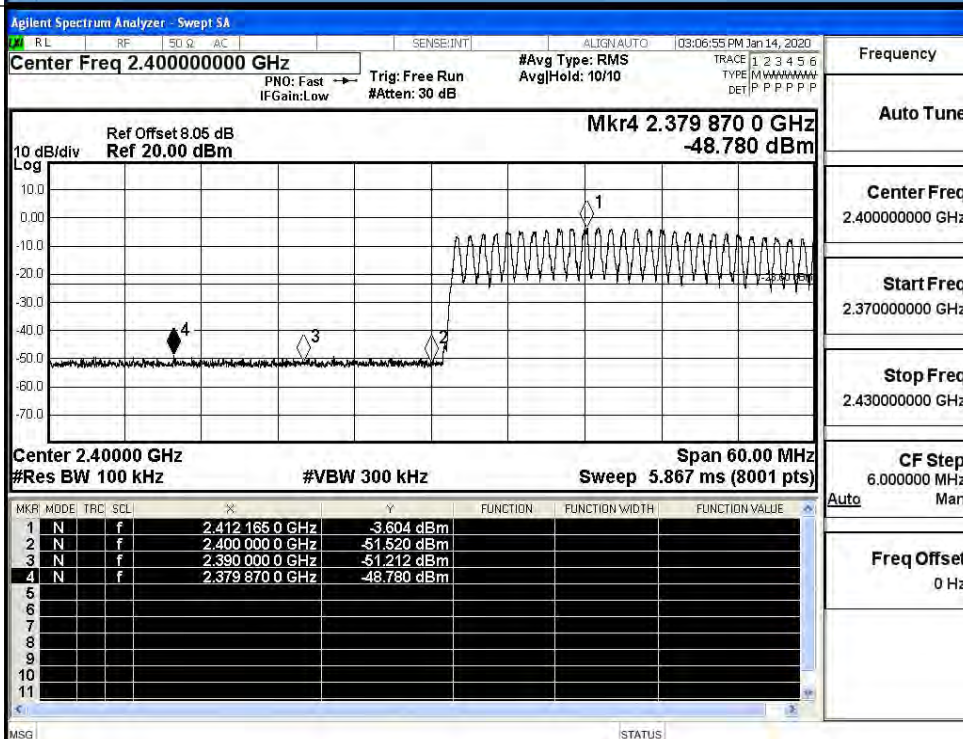
Start Freq
2.310000000 GHz

Stop Freq
2.404000000 GHz

CF Step
9.400000 MHz
Man

Freq Offset
0 Hz

GFSK/LCH/Hop



Frequency

Auto Tune

Center Freq
2.400000000 GHz

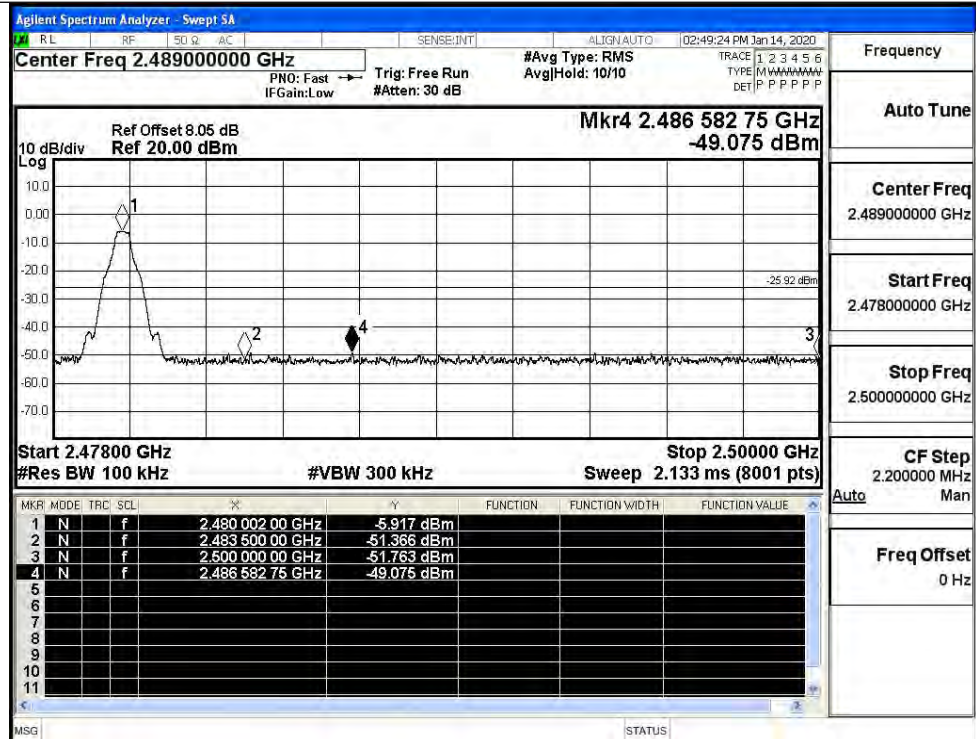
Start Freq
2.370000000 GHz

Stop Freq
2.430000000 GHz

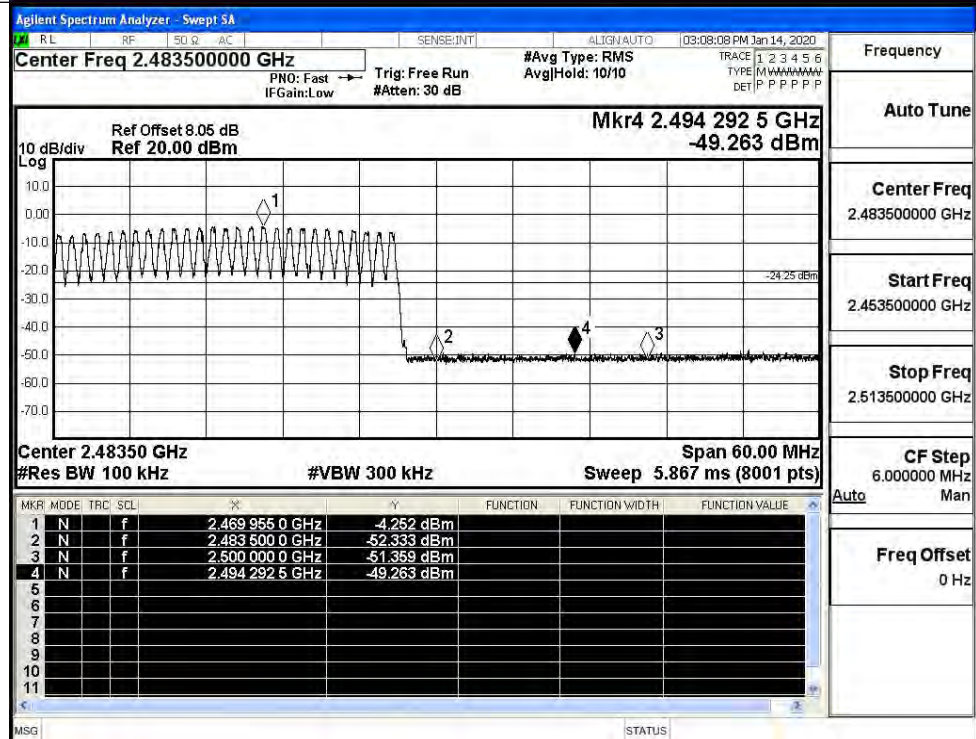
CF Step
6.000000 MHz
Man

Freq Offset
0 Hz

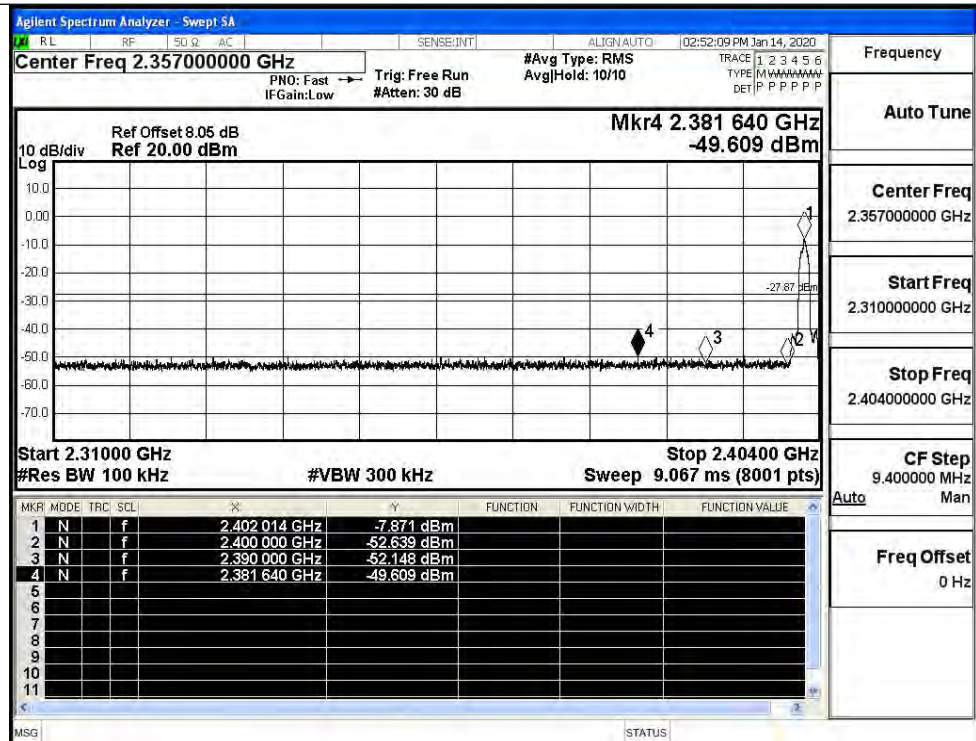
GFSK/HCH/No Hop



GFSK/HCH/Hop



$\pi/4$ DQPSK/LCH/No
Hop



Frequency

Auto Tune

Center Freq
2.357000000 GHz

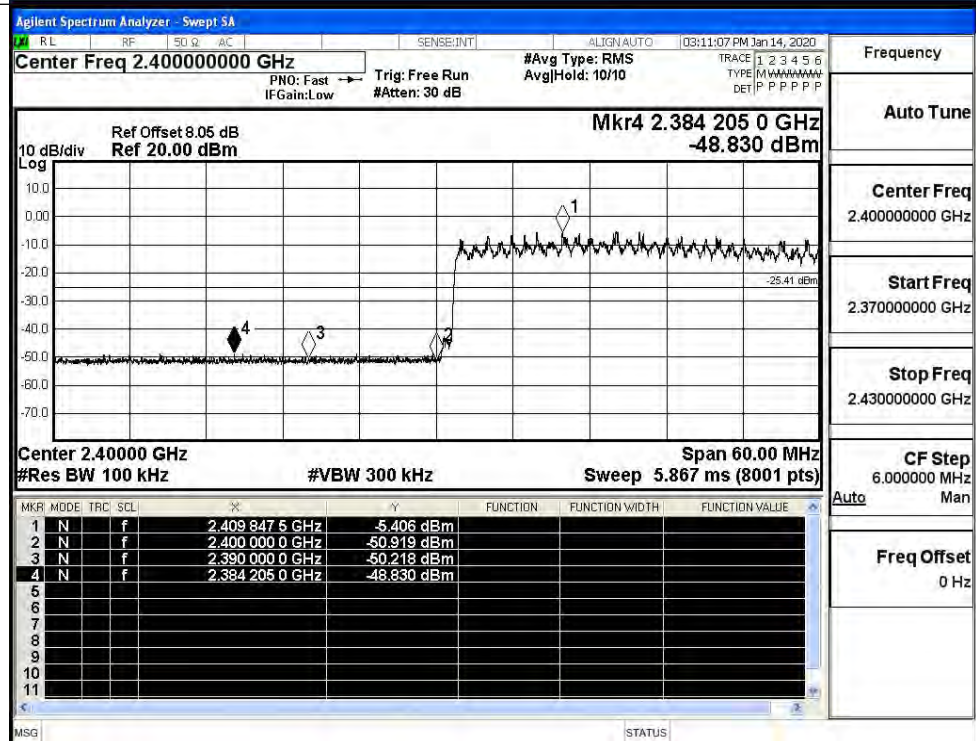
Start Freq
2.310000000 GHz

Stop Freq
2.404000000 GHz

CF Step
9.400000 MHz
Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/LCH/Hop



Frequency

Auto Tune

Center Freq
2.400000000 GHz

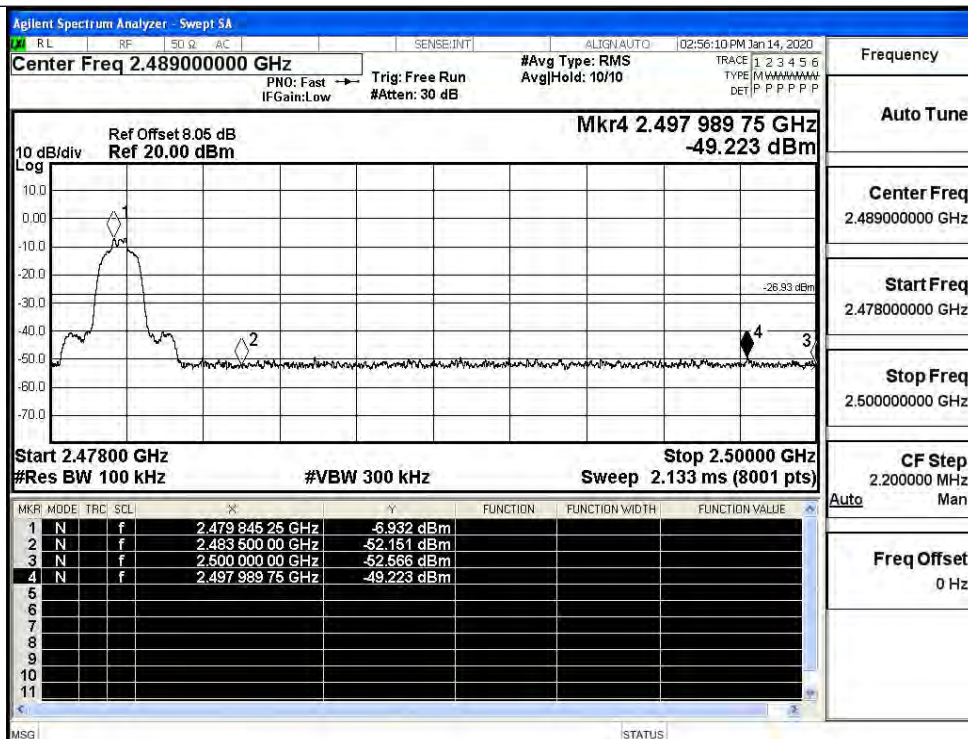
Start Freq
2.370000000 GHz

Stop Freq
2.430000000 GHz

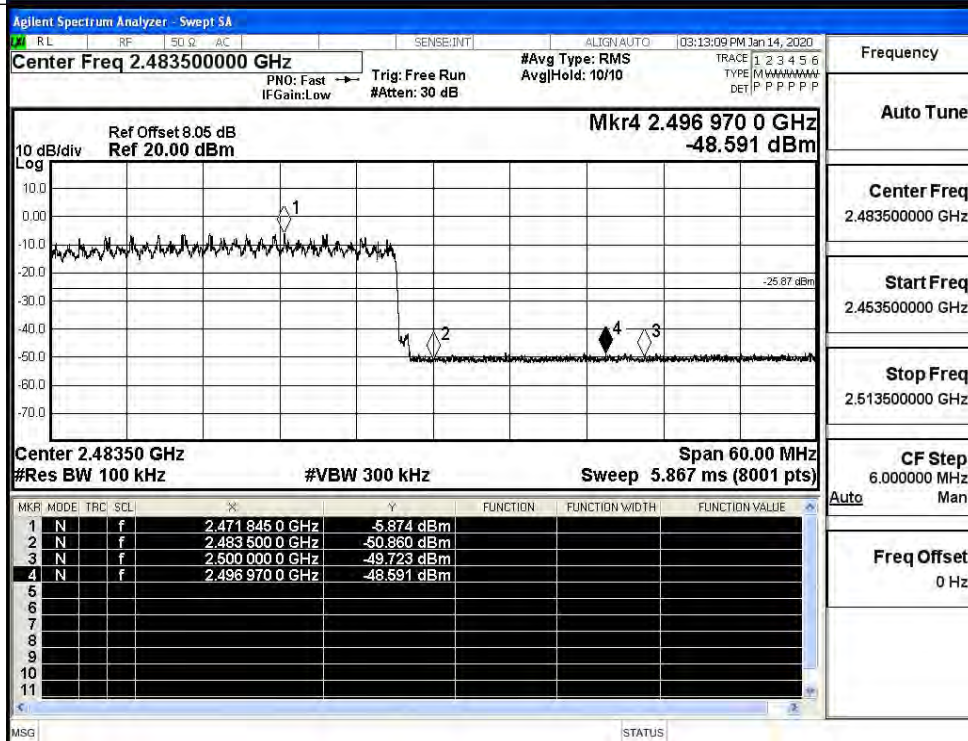
CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

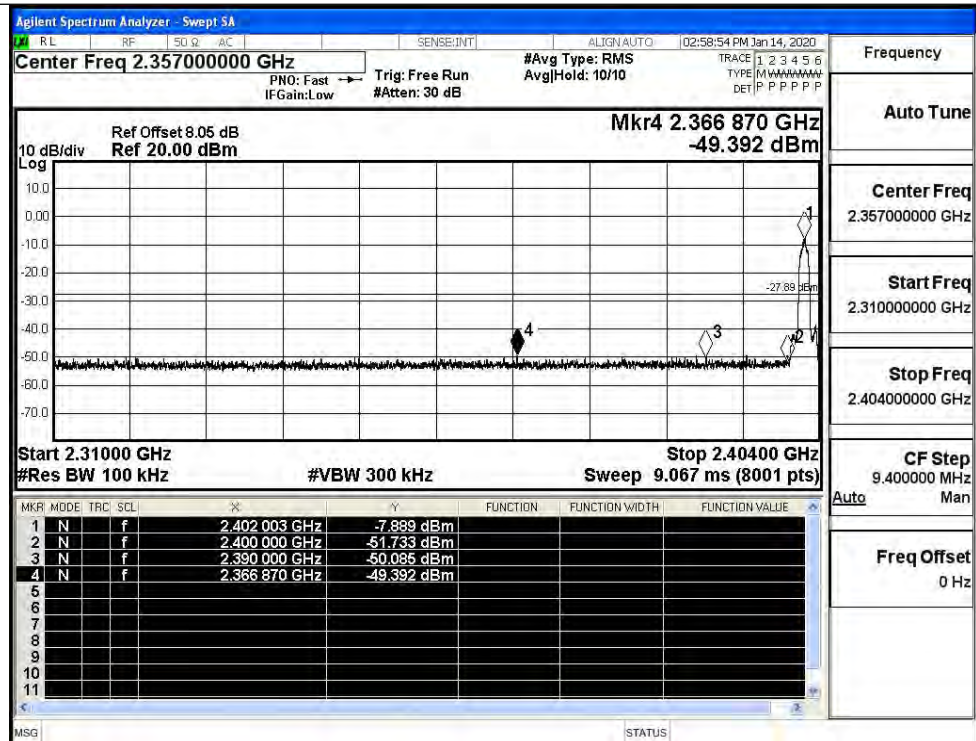
$\pi/4$ DQPSK/HCH/No
Hop



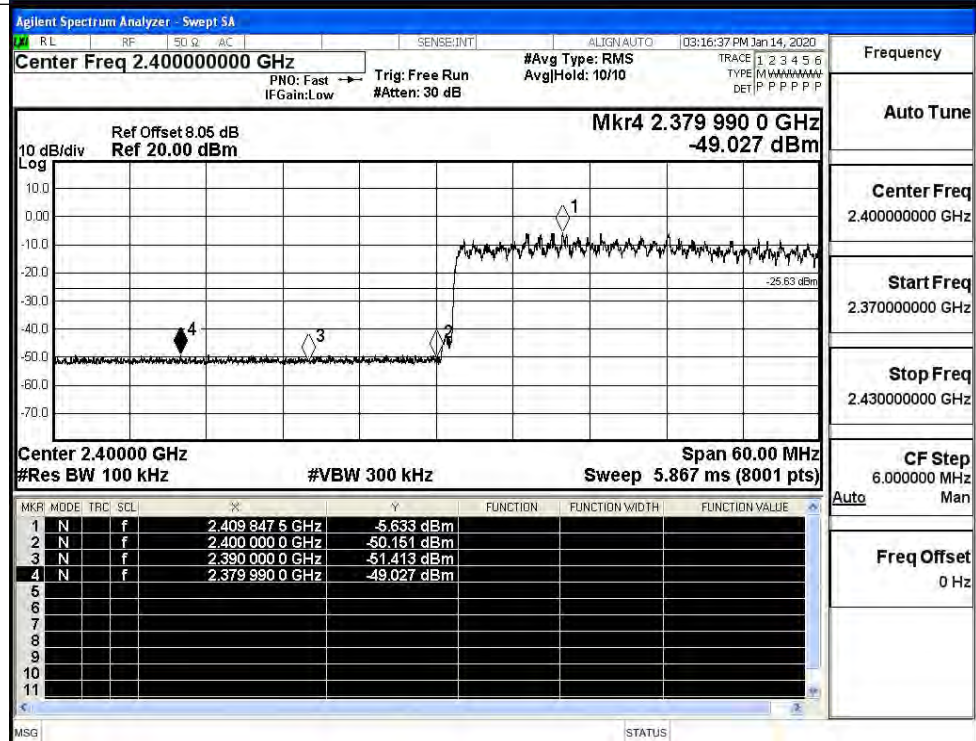
$\pi/4$ DQPSK/HCH/Hop



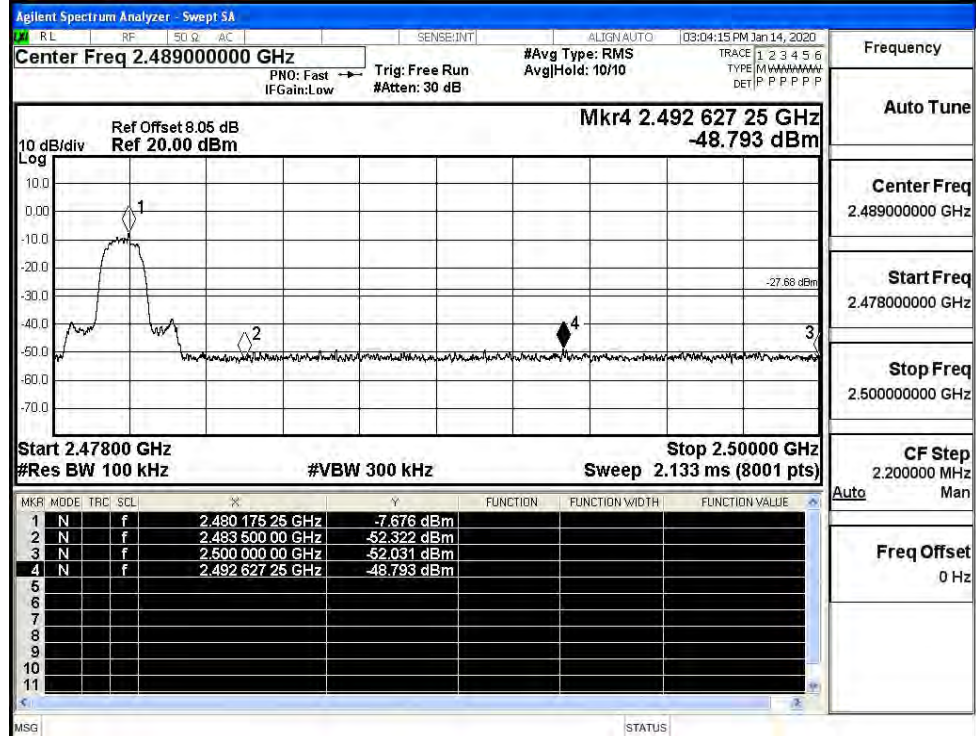
8DPSK/LCH/No Hop



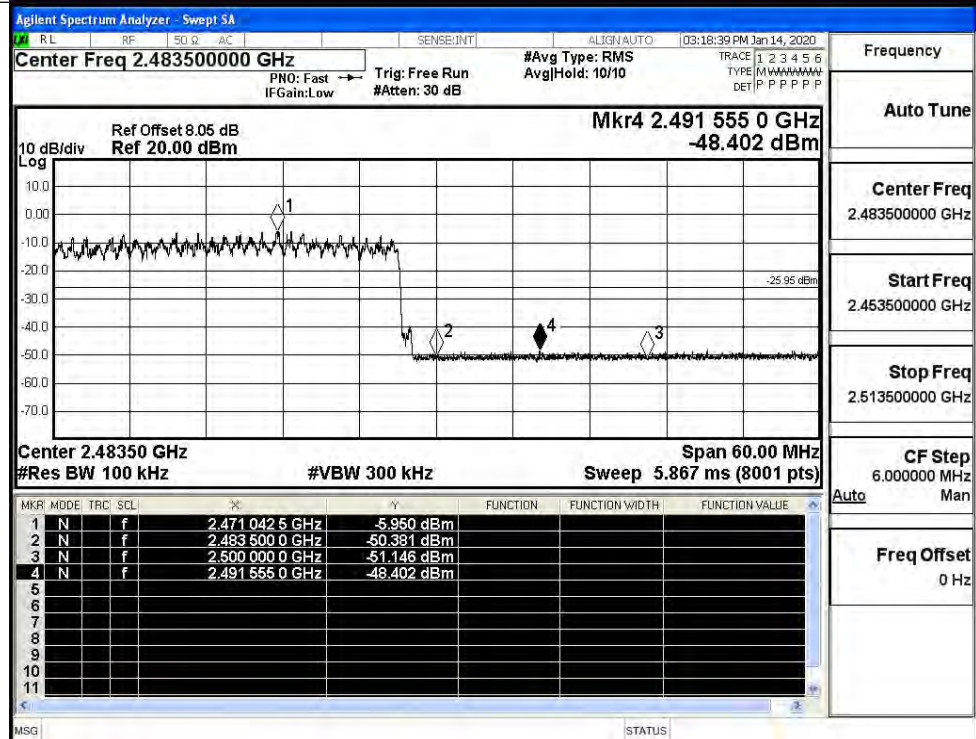
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



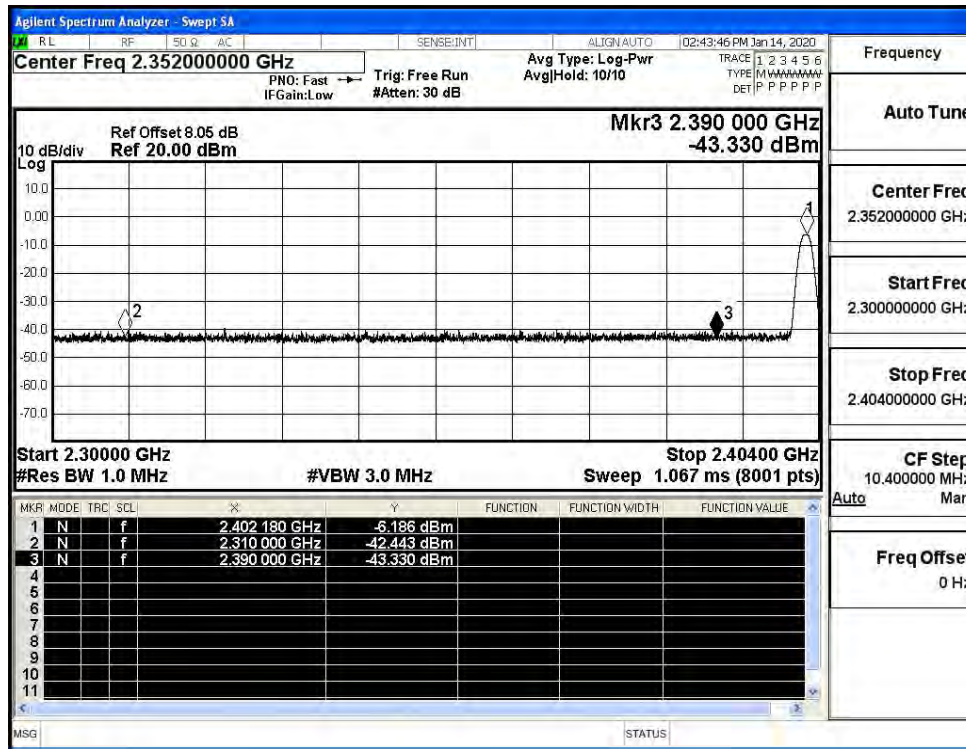
8DPSK/HCH/Hop



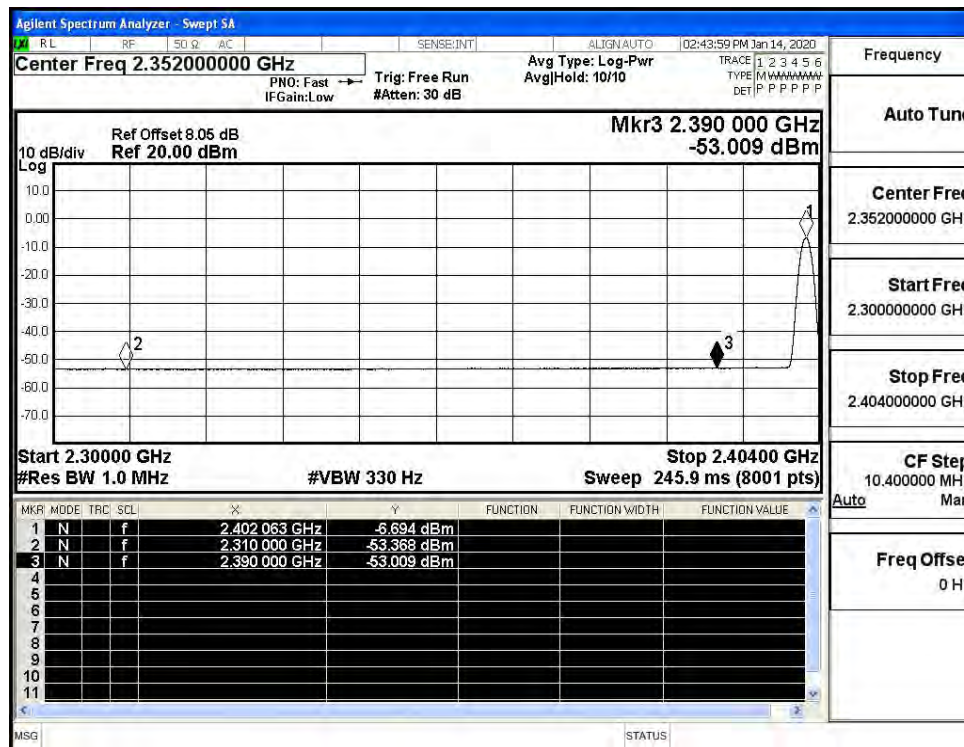
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-42.44	2.0	0	54.79	PEAK	74	PASS
	Off	2310.0	-53.37	2.0	0	43.86	AV	54	PASS
	Off	2390.0	-43.33	2.0	0	53.9	PEAK	74	PASS
	Off	2390.0	-53.01	2.0	0	44.22	AV	54	PASS
	Off	2483.5	-42.85	2.0	0	54.38	PEAK	74	PASS
	Off	2483.5	-52.55	2.0	0	40.68	AV	54	PASS
	Off	2500.0	-40.54	2.0	0	56.69	PEAK	74	PASS
	Off	2500.0	-52.38	2.0	0	44.85	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.09	2.0	0	54.14	PEAK	74	PASS
	Off	2310.0	-53.43	2.0	0	43.8	AV	54	PASS
	Off	2390.0	-40.55	2.0	0	56.68	PEAK	74	PASS
	Off	2390.0	-53.04	2.0	0	44.19	AV	54	PASS
	Off	2483.5	-42.02	2.0	0	55.21	PEAK	74	PASS
	Off	2483.5	-52.57	2.0	0	40.66	AV	54	PASS
	Off	2500.0	-41.10	2.0	0	56.13	PEAK	74	PASS
	Off	2500.0	-52.33	2.0	0	44.9	AV	54	PASS
8DPSK	Off	2310.0	-43.23	2.0	0	54	PEAK	74	PASS
	Off	2310.0	-53.39	2.0	0	43.84	AV	54	PASS
	Off	2390.0	-42.36	2.0	0	54.87	PEAK	74	PASS
	Off	2390.0	-52.93	2.0	0	44.3	AV	54	PASS
	Off	2483.5	-42.96	2.0	0	54.27	PEAK	74	PASS
	Off	2483.5	-52.59	2.0	0	40.64	AV	54	PASS
	Off	2500.0	-42.47	2.0	0	54.76	PEAK	74	PASS
	Off	2500.0	-52.35	2.0	0	44.88	AV	54	PASS

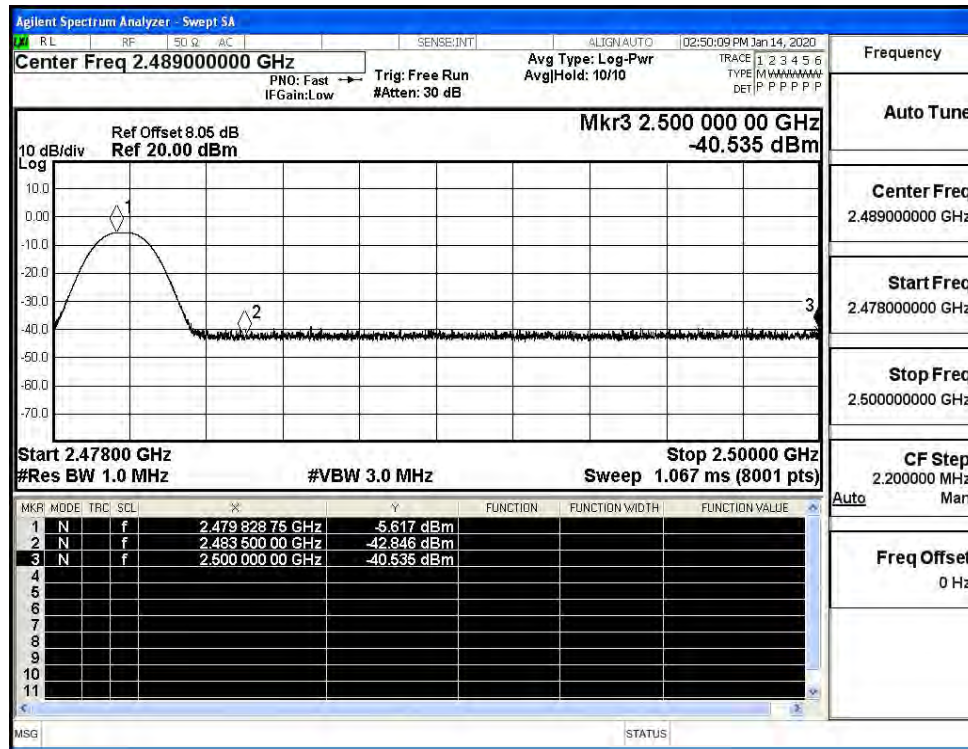
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



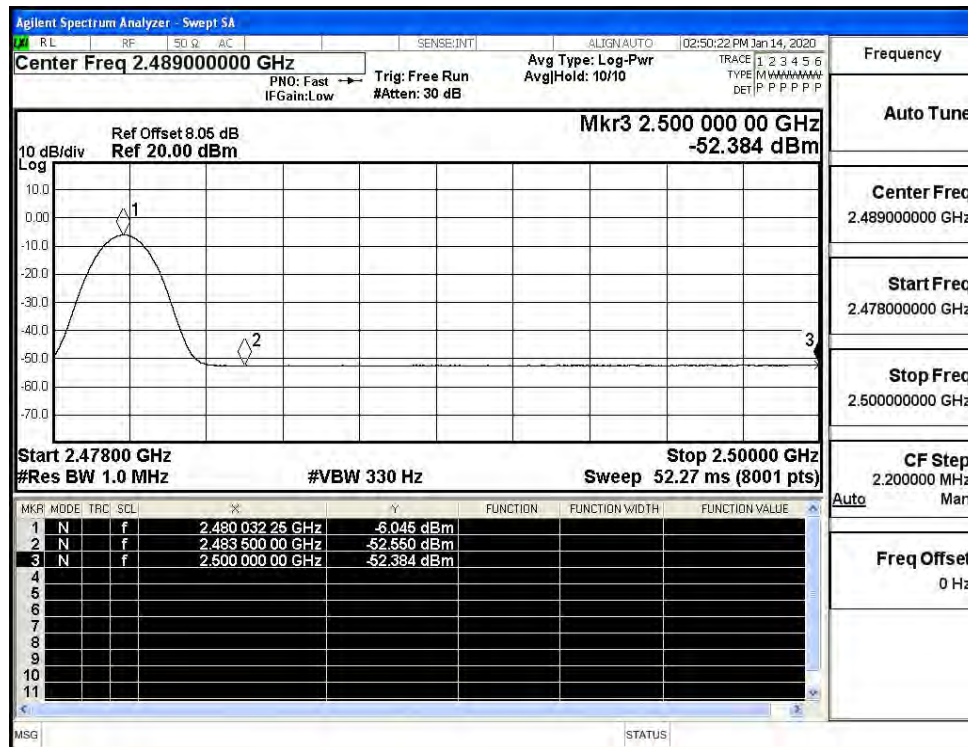
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



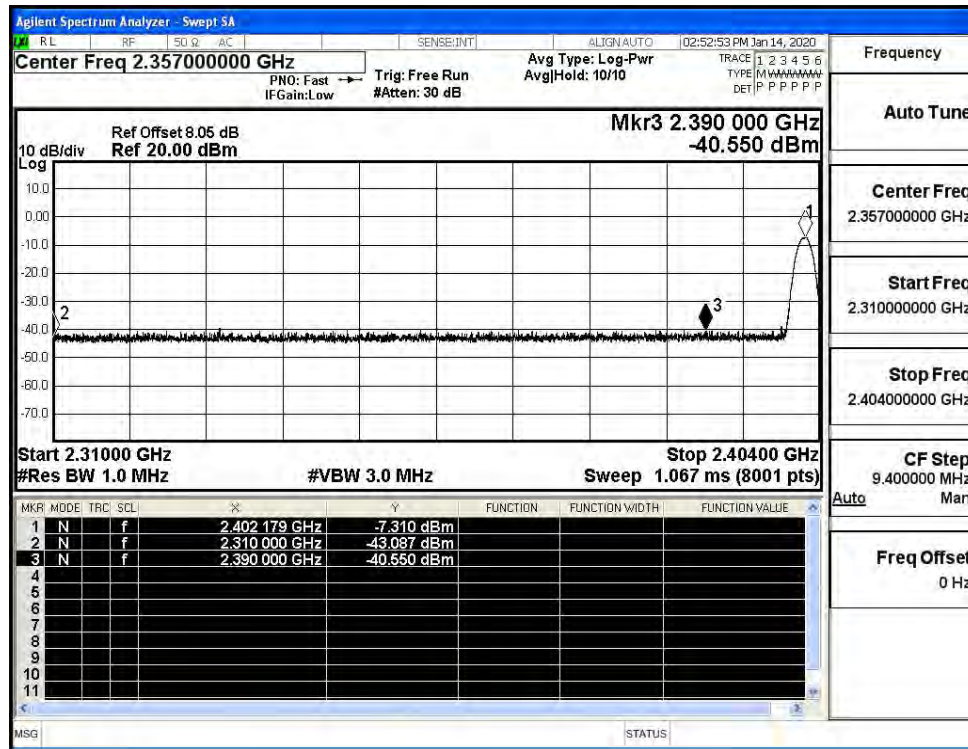
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



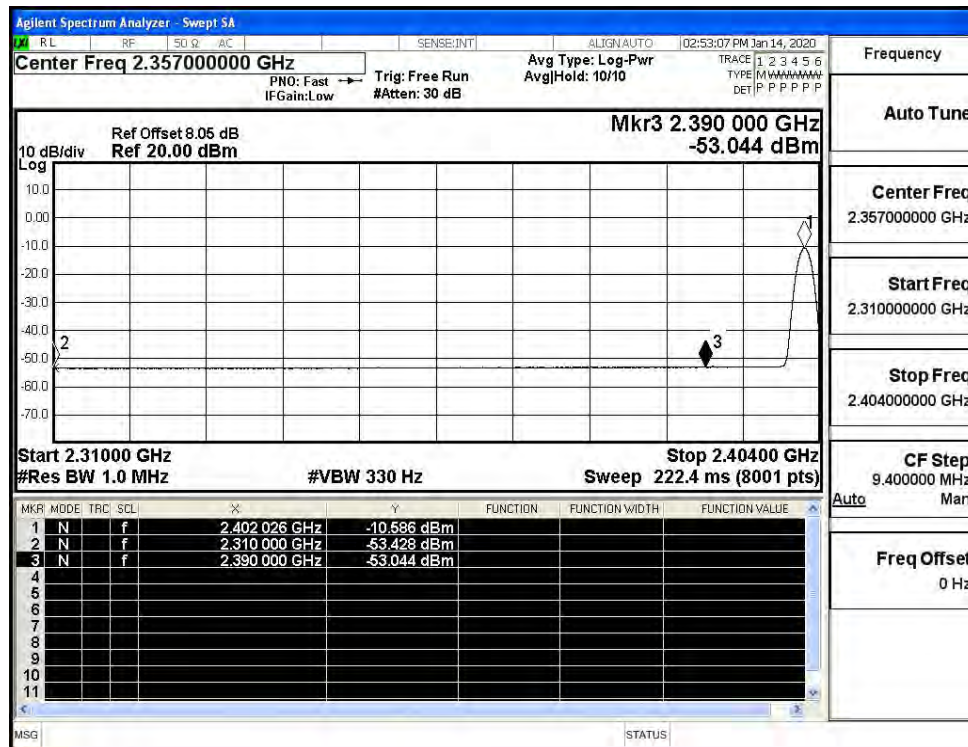
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



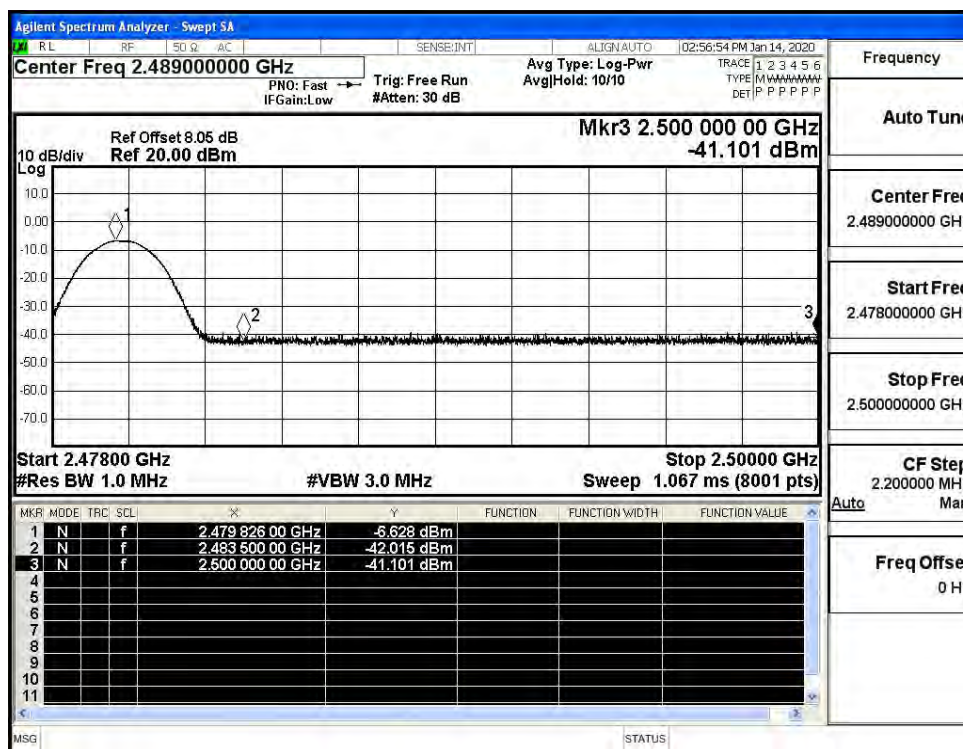
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



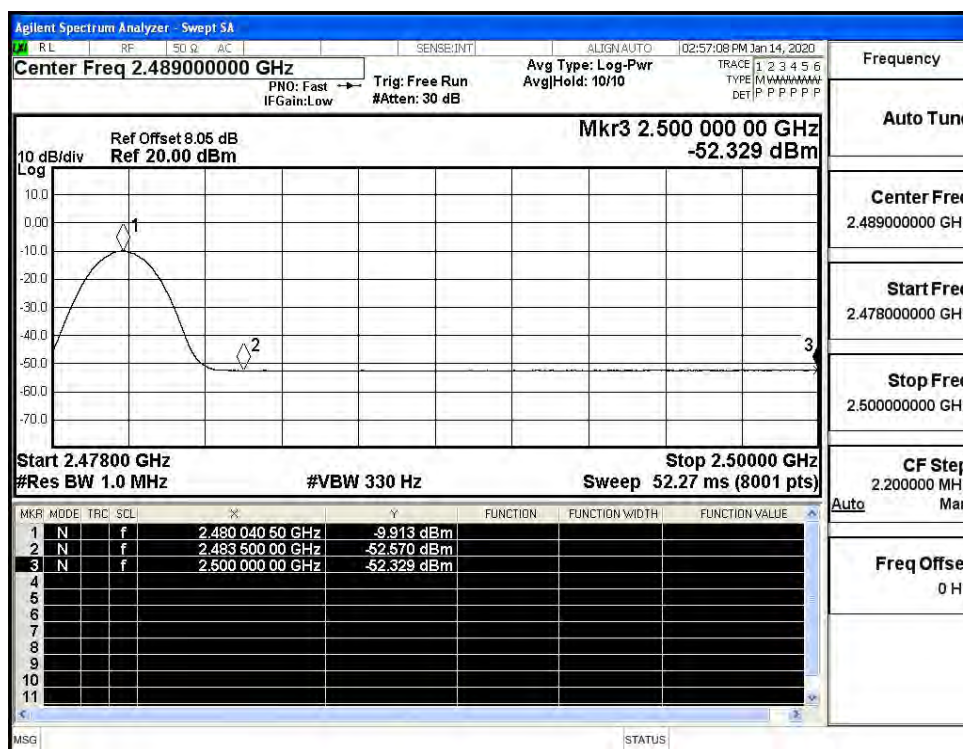
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



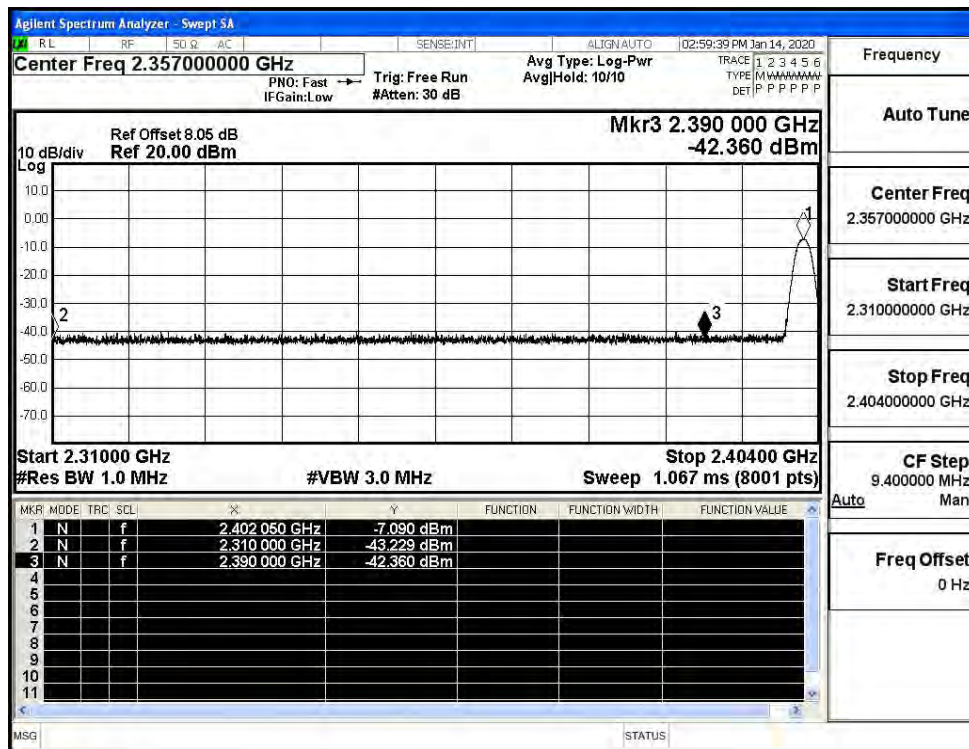
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



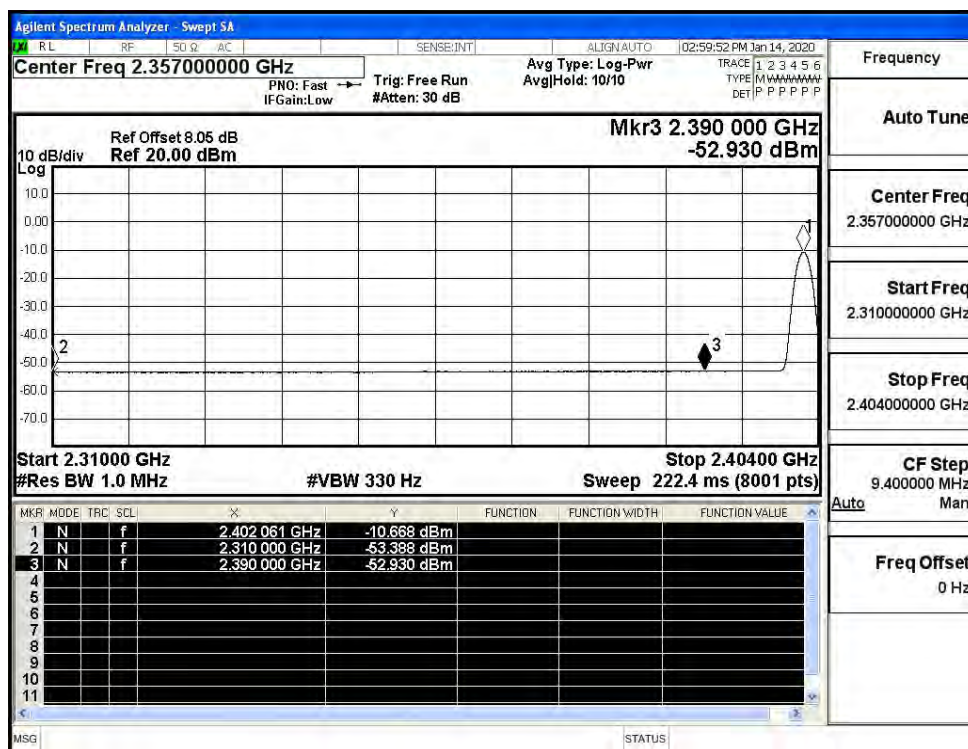
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



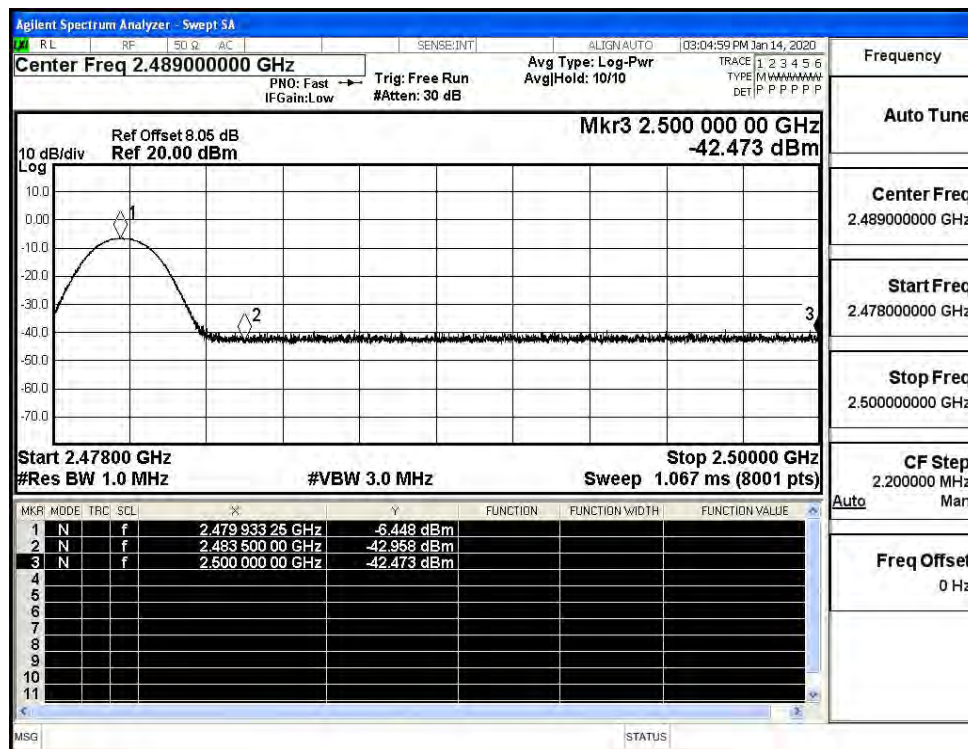
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (Low Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (High Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (High Channel)

